

# **2004 Lower Cook Inlet Annual Finfish Management Report**

**by**

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**and**

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**March 2005**

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**Alaska Department of Fish and Game**

**Divisions of Sport Fish and Commercial Fisheries**



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mideye-to-fork	MEF
gram	g	all commonly accepted		mideye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	<b>Mathematics, statistics</b>	
meter	m	at	@	<i>all standard mathematical</i>	
milliliter	mL	compass directions:		<i>signs, symbols and</i>	
millimeter	mm	east	E	<i>abbreviations</i>	
		north	N	alternate hypothesis	H <sub>A</sub>
		south	S	base of natural logarithm	<i>e</i>
		west	W	catch per unit effort	CPUE
		copyright	©	coefficient of variation	CV
		corporate suffixes:		common test statistics	(F, t, $\chi^2$ , etc.)
		Company	Co.	confidence interval	CI
		Corporation	Corp.	correlation coefficient	
		Incorporated	Inc.	(multiple)	R
		Limited	Ltd.	correlation coefficient	
		District of Columbia	D.C.	(simple)	r
		et alii (and others)	et al.	covariance	cov
		et cetera (and so forth)	etc.	degree (angular)	°
		exempli gratia		degrees of freedom	df
		(for example)	e.g.	expected value	<i>E</i>
		Federal Information		greater than	>
		Code	FIC	greater than or equal to	≥
		id est (that is)	i.e.	harvest per unit effort	HPUE
		latitude or longitude	lat. or long.	less than	<
		monetary symbols		less than or equal to	≤
		(U.S.)	\$, ¢	logarithm (natural)	ln
		months (tables and		logarithm (base 10)	log
		figures): first three		logarithm (specify base)	log <sub>2</sub> , etc.
		letters	Jan,...,Dec	minute (angular)	'
		registered trademark	®	not significant	NS
		trademark	™	null hypothesis	H <sub>0</sub>
		United States		percent	%
		(adjective)	U.S.	probability	P
		United States of		probability of a type I error	
		America (noun)	USA	(rejection of the null	
		U.S.C.	United States	hypothesis when true)	α
			Code	probability of a type II error	
		U.S. state	use two-letter	(acceptance of the null	
			abbreviations	hypothesis when false)	β
			(e.g., AK, WA)	second (angular)	"
				standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var
<b>Weights and measures (English)</b>					
cubic feet per second	ft <sup>3</sup> /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
<b>Time and temperature</b>					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees kelvin	K				
hour	h				
minute	min				
second	s				
<b>Physics and chemistry</b>					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

***FISHERY MANAGEMENT REPORT NO. 05-29***

**2004 LOWER COOK INLET ANNUAL FINFISH  
MANAGEMENT REPORT**

by

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# TABLE OF CONTENTS

	<b>Page</b>
LIST OF TABLES.....	iii
LIST OF FIGURES.....	iii
LIST OF APPENDICES .....	iii
ABSTRACT .....	1
2004 COMMERCIAL SALMON FISHERY.....	1
Introduction .....	1
Preseason Forecast.....	3
2004 Summary by Species.....	4
Chinook Salmon .....	4
Sockeye Salmon.....	4
Coho Salmon .....	6
Pink Salmon.....	6
Chum Salmon .....	7
2004 Exvessel Value .....	7
2004 District Inseason Management Summaries.....	7
Southern District.....	7
Set Gillnet Fishery.....	7
Seine Fishery .....	8
Sockeye Salmon .....	8
Pink Salmon .....	10
Other Species.....	13
Kamishak Bay District.....	13
Sockeye Salmon .....	13
Pink Salmon .....	15
Chum Salmon.....	16
Other Species.....	17
Outer District .....	18
Sockeye Salmon .....	18
Pink Salmon .....	20
Chum Salmon.....	21
Eastern District .....	22
Sockeye Salmon .....	22
Pink Salmon .....	24
Other Species.....	25
2004 SALMON ENHANCEMENT AND REHABILITATION .....	25
Introduction .....	25
Tutka Lagoon Hatchery .....	26
Leisure and Hazel Lakes Sockeye Salmon Stocking.....	27
English Bay Sockeye Salmon Rehabilitation .....	27
Bear Lake Sockeye Salmon Enhancement .....	29
Grouse Lake Sockeye Salmon Stocking.....	30
Chenik lake Sockeye Salmon Enhancement.....	30
Other Sockeye Salmon Lake Stocking .....	32
Halibut Cove Lagoon and Seldovia Bay Chinook Salmon Enhancement .....	33
Port Graham Hatchery .....	33
Paint River Fish Pass .....	35

## TABLE OF CONTENTS (Continued)

	Page
2005 COMMERCIAL SALMON FISHERY OUTLOOK.....	36
Sockeye Salmon .....	36
Pink Salmon.....	36
Chum Salmon .....	37
Chinook and Coho Salmon.....	37
2004 SUBSISTENCE AND PERSONAL USE SALMON NET FISHERIES .....	38
Kachemak Bay Personal Use Set Gillnet Fishery.....	38
Nanwalek/Port Graham Subsistence Fishery.....	41
Seldovia Area Subsistence Salmon Gillnet Fishery.....	42
2004 COMMERCIAL HERRING FISHERY .....	43
Introduction .....	43
History and Development of the Sac Roe Fishery .....	44
Introduction .....	44
Outer/Eastern Districts.....	44
Southern District.....	45
Kamishak Bay District.....	45
2004 Herring Season Overview .....	46
Assessment Methods .....	46
Kamishak Bay District 2004 Season Summary .....	47
Southern District 2004 Season Summary .....	48
Outer/Eastern District 2004 Season Summary.....	48
Recent Herring Research in Lower Cook Inlet.....	49
2005 Herring Season Outlook .....	49
Kamishak Bay District.....	49
Other Districts.....	50
2004 ALASKA BOARD OF FISHERIES MEETING .....	50
Regulatory Actions .....	50
LCI Escapement Goal Review.....	51
ACKNOWLEDGEMENTS.....	52
REFERENCES CITED .....	53
TABLES AND FIGURES.....	55
APPENDIX A. HISTORICAL SALMON TABLES .....	91
APPENDIX B. HISTORICAL HERRING TABLES .....	137

## LIST OF TABLES

Table	Page
1. Commercial, hatchery, and derby salmon catches in numbers of fish by species, district, and gear type, Lower Cook Inlet, 2004.....	56
2. Commercial Chinook salmon catches and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.....	57
3. Commercial sockeye salmon catches (including hatchery cost recovery) and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004. ....	58
4. Commercial coho salmon catches (including hatchery cost recovery and sport derby sold to commercial processors) and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004. ....	60
5. Commercial pink salmon catches (including hatchery cost recovery) and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.....	61
6. Commercial chum salmon catches and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.....	63
7. Emergency orders issued for the commercial, personal use, and subsistence salmon fisheries in Lower Cook Inlet, 2004.....	66

## LIST OF FIGURES

Figure	Page
1. Lower Cook Inlet salmon and herring management area.....	77
2. Commercial set gillnet locations in the Southern District of Lower Cook Inlet.....	78
3. China Poot and Hazel Lake Special Harvest Areas for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet. ....	79
4. Tutka Bay Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet. ....	80
5. Kirschner Lake Special Harvest Area for salmon hatchery cost recovery in Kamishak Bay District of Lower Cook Inlet.....	81
6. Port Graham Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.....	82
7. Commercial herring fishing areas for management purposes in Kamishak Bay District of Lower Cook Inlet.....	83
8. Total commercial salmon catch, Lower Cook Inlet, 1984 – 2004.....	84
9. Commercial sockeye salmon catch by district, Lower Cook Inlet, 1984 – 2004. ....	85
10. Sockeye salmon returns to Leisure and Hazel Lakes in the Southern District of Lower Cook Inlet, 1979 – 2004.....	86
11. Commercial pink salmon catch by district, Lower Cook Inlet, 1984 – 2004. ....	87
12. Commercial chum salmon catch by district, Lower Cook Inlet, 1984 – 2004. ....	88
13. Biomass estimates and commercial harvests of Pacific herring in the sac roe seine fishery, Kamishak Bay District, Lower Cook Inlet, 1984 – 2004, and 2005 projection. ....	89
14. Herring age composition from samples collected in Kamishak Bay District, Lower Cook Inlet, 2004, and 2005 forecast. ....	90

## LIST OF APPENDICES

Appendix	Page
A1. Salmon fishing permits issued and fished, by gear type, Lower Cook Inlet, 1984 – 2004.....	92
A2. Exvessel value of the commercial salmon harvest in thousands of dollars by species, Lower Cook Inlet, 1984 – 2004.....	93
A3. Average salmon price in dollars per pound by species, Lower Cook Inlet, 1984 – 2004.....	94
A4. Salmon average weight in pounds per fish by species in the commercial fishery, Lower Cook Inlet, 1984 – 2004.....	95
A5. Commercial salmon catch in numbers of fish by species, Lower Cook Inlet, 1984 – 2004.....	96

## LIST OF APPENDICES (Continued)

	Page
A6. Commercial salmon catch in numbers of fish by species in the Southern District, Lower Cook Inlet, 1984 – 2004.....	97
A7. Commercial set gillnet catch of salmon in numbers of fish by species in the Southern District, Lower Cook Inlet, 1984 – 2004.....	98
A8. Commercial salmon catch in numbers of fish by species in the Outer District, Lower Cook Inlet, 1984 – 2004.....	99
A9. Commercial salmon catch in numbers of fish by species in the Eastern District, Lower Cook Inlet, 1984 – 2004.....	100
A10. Commercial salmon catch in numbers of fish by species in the Kamishak Bay District, Lower Cook Inlet, 1984 – 2004.....	101
A11. Total commercial salmon catch in numbers of fish by district, Lower Cook Inlet, 1984 – 2004.....	102
A12. Commercial Chinook salmon catch in numbers of fish by district, Lower Cook Inlet, 1984 – 2004.....	103
A13. Commercial sockeye salmon catch in numbers of fish by district, Lower Cook Inlet, 1984 – 2004.....	104
A14. Commercial sockeye salmon catch in thousands of fish by subdistrict, Lower Cook Inlet, 1959 – 2004.....	105
A15. Harvest of sockeye salmon returning to China Poot and Neptune Bays in the Southern District of Lower Cook Inlet, by user group, 1979 – 2004.....	107
A16. Commercial catch and escapement of sockeye salmon at Chenik Lake in the Kamishak Bay District of Lower Cook Inlet, 1975 – 2004.....	108
A17. Commercial coho salmon catch in numbers of fish by district, Lower Cook Inlet, 1984 – 2004.....	109
A18. Commercial pink salmon catch in numbers of fish by district, Lower Cook Inlet, 1984 – 2004.....	110
A19. Commercial pink salmon catch in thousands of fish by subdistrict during odd-numbered years, Lower Cook Inlet, 1959 – 2003.....	111
A20. Commercial pink salmon catch in thousands of fish by subdistrict during even-numbered years, Lower Cook Inlet, 1960 – 2004.....	113
A21. Commercial chum salmon catch in numbers of fish by district, Lower Cook Inlet, 1984 – 2004.....	115
A22. Commercial chum salmon catch in thousands of fish by subdistrict, Lower Cook Inlet, 1959 – 2004.....	116
A 23. Estimated sockeye salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1984 – 2004.....	118
A24. Estimated pink salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1960 – 2004.....	119
A25. Estimated chum salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1984 – 2004.....	124
A26. Biological escapement goals (BEG's) prior to 2002 and sustainable escapement goals (SEG's) beginning in 2002 for chum salmon systems in Lower Cook Inlet, Alaska.....	125
A27. Biological escapement goals (BEG's) prior to 2002 and sustainable escapement goals (SEG's) beginning in 2002 for pink salmon systems in Lower Cook Inlet, Alaska.....	126
A28. Biological escapement goals (BEG's) prior to 2002 and sustainable escapement goals (SEG's) beginning in 2002 for sockeye salmon systems in Lower Cook Inlet, Alaska.....	127
A29. Personal use/subsistence set gillnet salmon catches, in numbers of fish by species, and effort, Southern District, Lower Cook Inlet, 1969 – 2004.....	128
A30. Summary of personal use/subsistence salmon gillnet fishermen in the Southern District of Lower Cook Inlet (excluding the Port Graham/Nanwalek subsistence fishery and the Seldovia subsistence fishery) by area of residence, 1984 – 2004.....	129
A31. Subsistence and sport salmon catch in numbers of fish by species for the village of Port Graham, Lower Cook Inlet, 1984 – 2004.....	130
A32. Subsistence and sport salmon catch in numbers of fish by species for the village of Nanwalek (formerly English Bay), Lower Cook Inlet, 1984 – 2004.....	131
A33. Salmon set gillnet catch in numbers of fish by species and permit/effort information for the Seldovia area subsistence fishery, Lower Cook Inlet, 1996 – 2004.....	132
A34. ADF&G, CIAA, and/or CRRC salmon stocking projects and releases of salmon fry, fingerling, and smolt, in millions of fish, Lower Cook Inlet, 1984 – 2004.....	133

## LIST OF APPENDICES (Continued)

	<b>Page</b>
B1. Catch of Pacific herring in short tons and effort in number of permits by district in the commercial sac roe seine fishery, Lower Cook Inlet, 1984–2004. ....	138
B2. Preseason estimates of biomass and projected commercial sac roe seine harvests, and actual harvests, for Pacific herring <i>Clupea pallasii</i> in short tons, average roe recovery, numbers of permits making landings, and exvessel value in millions of dollars, Kamishak Bay District, Lower Cook Inlet, 1984–2004.....	139
B3. Summary of herring sac roe seine fishery openings and commercial harvests in the Kamishak Bay District of Lower Cook Inlet, 1969–2004. ....	140
B4. Estimates of Pacific herring <i>Clupea pallasii</i> total biomass in short tons using two different methods, actual commercial sac roe seine harvest in short tons, and percent exploitation, Kamishak Bay District, Lower Cook Inlet, 1984 – 2004.....	141



## **ABSTRACT**

The 2004 Lower Cook Inlet commercial salmon fishery was characterized by lower than average sockeye harvests and higher than average pink and chum harvests. The all-species harvest totaled approximately 2.868 million fish, dominated by pink salmon at 88% and chum salmon at 7%. The exvessel value was approximately \$1.27 million, the second lowest over the past decade. Participation remained at low levels for the only two allowable gear groups, purse seine and set gillnet, and was similar to the previous three seasons. Salmon enhancement continued to play a key role in commercial harvests due to numerous sockeye salmon lake stocking projects and two different pink salmon hatcheries. The harvest of salmon for cost recovery purposes by hatchery facilities once again comprised a significant portion of the overall Lower Cook Inlet commercial catches, estimated at approximately 87% in numbers of fish and 27% in exvessel value.

The Southern District Personal Use Coho Salmon Fishery in Kachemak Bay produced a harvest of an estimated 1,550 coho salmon, falling at the mid-point of the guideline harvest range of 1,000 to 2,000 coho salmon. Participation in the fishery, at 64 permits actively fished, was the lowest level since 1974.

The commercial herring fishery in Lower Cook Inlet was closed during 2004 for the sixth consecutive season due to continuing low abundance levels.

Key words: Lower Cook Inlet, commercial salmon harvest, salmon enhancement, hatchery, cost recovery, personal use fishery, purse seine, set gillnet, escapement, Pacific herring.

## **2004 COMMERCIAL SALMON FISHERY**

### **INTRODUCTION**

The Lower Cook Inlet (LCI) management area, comprised of all waters west of the longitude of Cape Fairfield, north of the latitude of Cape Douglas, and south of the latitude of Anchor Point, is divided into five fishing districts (Figure 1). The Barren Islands District is the only fishing district where no salmon fishing occurs, with the remaining four districts (Southern, Outer, Eastern, and Kamishak Bay) separated into approximately 40 subdistricts and sections to facilitate management of discrete stocks of salmon and herring.

The 2004 LCI all-species salmon harvest of 2.868 million fish (Table 1, Figure 8) was the third highest during the past decade, exceeding the recent 10-year average of 1.880 million by over 50% (Appendix A5). Although the overall harvest failed to achieve the cumulative preseason forecast, strong returns of chum salmon continued for the fifth straight year, resulting in a commercial catch of over 200,000 fish, the highest since 1989. Prices paid for salmon this season yielded an estimated LCI exvessel value of just under \$1.27 million (Table 7), making the value of the 2004 harvest only about 62% of the recent 10-year average and the second lowest during that time period (Appendix A2). Seine fishing effort was the second lowest since statewide implementation of the limited entry system, with only 24 of 86 permit holders making deliveries this season (Appendix A1), while the number of active set gillnet permits was 19 (Appendix A1), down slightly from the previous two seasons and also from the recent 10-year average.

Once again, LCI commercial salmon harvests in 2004 relied heavily on the success of hatchery and enhanced fish production. An estimated 52% of the sockeye salmon harvest in numbers of fish was attributed to lake stocking and fertilization projects, most of which were originally begun by the Alaska Department of Fish and Game (ADF&G) but are currently maintained by Cook Inlet Aquaculture Association (CIAA). These projects were conducted at Leisure and Hazel Lakes in the Southern District, Kirschner Lake in the Kamishak Bay District, and Bear Lake in the Eastern District. Another traditional sockeye salmon enhancement program, conducted by the Nanwalek Salmon Enhancement Project (NSEP) in conjunction with Chugach

Regional Resources Commission (CRRC) at English Bay Lakes in the Southern District, contributed almost 2,600 sockeyes, or another 2% of the overall LCI sockeye total, to commercial set gillnet harvests this season. Additional fish resulting from this project were also harvested in local subsistence fisheries. Unfortunately, the overall area-wide commercial harvest of sockeye salmon in LCI, at just over 130,000 fish, fell far below the recent 10-year average of 322,000 (Appendix A13).

Pink salmon production from Tutka Hatchery, now operated by CIAA, surpassed expectations, with an overall estimated return of nearly 1.2 million fish (Table 9), representing the highest figure for this facility since 1999. The total catch of 1.177 million Tutka Hatchery pinks exceeded the preseason harvest projection by about 88%. Another pink salmon hatchery, located in Port Graham of the Southern District, also experienced a better than expected return, with a harvest totaling nearly 1.3 million fish.

As has been the case since hatchery programs were taken over by private non-profit (PNP) corporations in LCI, a significant portion of the salmon harvest was utilized as hatchery cost recovery to recoup expenses incurred by the various stocking and enhancement projects throughout the management area. About 87% of the total salmon harvest in numbers of fish was taken by CIAA and Port Graham Hatchery Corporation (PGHC) to support the lake stocking programs and Tutka and Port Graham Hatcheries operations, representing about 27% of the exvessel value of the LCI salmon fishery (Table 7). Similar to the past several seasons, strong natural returns of chum salmon bound for LCI drainages provided commercial fishermen with the greatest harvest of that species since 1988 at over 200,000 fish. It should be noted that all chum salmon in LCI are a result of natural production since no enhancement programs for this species occur.

The shortage of regular tender service in remote districts, a notable factor that has affected the amount and distribution of seine effort, and ensuing harvest of salmon, in LCI over the past decade, once again influenced overall harvests during 2004. The policy to severely restrict or eliminate such remote tender service was adopted in 1994 by major processors as a means to reduce costs. Prior to that time processors routinely stationed a tender (or tenders) in remote districts in anticipation of salmon harvests, even when run strengths and catches were marginal. Once that policy was abandoned, however, seiners were forced to devise their own means to transport fish from these remote areas to a processing plant in Homer or elsewhere. Due to equipment limitations and the high cost of contracting out for tendering services, significant numbers of fishermen were often unable to fish in remote areas, while some retained the flexibility to fish these traditional areas because of onboard chilling equipment. The relatively weak pink salmon returns to LCI in 2004, combined with weak markets, produced a general lack of buyers for this species, which in turn substantially reduced tender service in remote areas. In spite of the worldwide market situation, prices for most salmon species actually improved this season (Appendix A3). The exception was for pink salmon, with the average price falling yet again to an all-time record low for this species. This pricing structure, coupled with the small numbers of available buyers and limited tender service, frequently dictated the fishing strategy of individual fishermen, even to the point of total non-participation, thus contributing to continuing low levels of seine effort.



## PRESEASON FORECAST

The projected 2004 LCI all-species salmon harvest of nearly 3.2 million fish was more than twice the recent 20-year average. Formal total run forecasts for natural salmon returns other than pink salmon were not prepared because escapement and age-weight-length data are limited for those species. However, catch projections were calculated from relative estimates of parental run size, average age composition data, and recent relative productivity trends.

Preseason harvest projections and actual catches for all species in 2004 are listed below:

Species	Projected Harvest	Actual Harvest	1983-2002 Average
Chinook	1,300	1,660	1,404
Sockeye	162,500	130,121	283,479
Coho	13,700	12,436	12,212
Pink	2,991,000	2,517,564	1,174,242
Chum	23,600	206,683	51,919
Total	3,192,200	2,868,464	1,523,256

Enhanced runs to Leisure and Hazel Lakes in the Southern District, Kirschner Lake in the Kamishak Bay District, and Bear Lake in the Eastern District were expected to comprise the bulk of the sockeye returns, albeit in much reduced numbers compared to recent years. The sockeye return to the English Bay Lakes system in the Southern District, increasingly important in recent years, was not expected to produce any harvestable surplus for commercial set gillnet harvests in LCI due to a lack of stocking in 2001 and 2002. Although Chenik Lake in the Kamishak Bay District benefited from regular fry stocking and intermittent fertilization during the 1980's and early 1990's, the program was suspended after 1996 due to an epizootic of Infectious Hematopoietic Necrosis Virus (IHNV) within the system in previous years. Despite the lack of enhanced production, the adult return in 2003 was surprisingly good, totaling almost 14,000 sockeyes. As a result, the outlook for the adult sockeye return in 2004 was questionable, making it unclear if protection of the entire Chenik run for escapement purposes would be required.

The return to the Tutka Bay Hatchery was once again expected to provide the majority of the pink salmon catch in LCI, with a forecasted harvest approaching 640,000 fish. The projection was based on typical recent-year survivals from a release of 68 million fry from Tutka Hatchery in 2003 (Appendix A34). In a major development surrounding this facility, CIAA announced prior to the season that the Tutka Hatchery facility was suspending operations this season, and therefore no broodstock collection was planned. As a result, CIAA anticipated utilizing all returning hatchery pinks for cost recovery purposes. The pink salmon return to Port Graham Hatchery was forecasted to produce a harvest of about 740,000 fish, all of which would be likely be required for cost recovery, while broodstock requirements were expected to total an additional 191,000 fish.

Relatively good pink salmon escapements to major Outer and Kamishak Bay Districts systems in 2002 contributed to a harvest projection of over 1.6 million naturally produced pinks throughout the entire LCI management area this season. However, the unknown effects of severe flooding throughout the Kenai Peninsula in the fall of 2002 left the accuracy of this forecast in serious question. Port Dick, Windy, Rocky, and Nuka Island Subdistricts in the Outer District, as well as

Bruin Bay and Ursus Cove Subdistricts in the Kamishak Bay District, all figured to provide the most potential for harvestable surpluses, but the projected fishing effort in these remote districts was uncertain due to the weak markets and unknown levels of available tender service.

Due to four consecutive seasons of relatively strong chum salmon returns and catches in LCI, the chum salmon harvest outlook in 2004 once again appeared positive. Most west-side LCI systems experienced reasonably good escapements during the 1999 and 2000 parent years, and recent years' returns to area systems have continued to display a generally encouraging trend. Numerous systems, especially those in northern Kamishak Bay, seemed to be responding positively to conservative management measures employed in the 1990's decade, while chum returns to the larger Big and Little Kamishak Rivers have been comparatively strong during the previous four years. The good catches during the past four seasons, as well as the recent overall trend, suggested that harvest opportunities for chums could be numerous in 2004.

## **2004 SUMMARY BY SPECIES**

### **Chinook Salmon**

The harvest of Chinook salmon, not normally a commercially important species in LCI, was the third highest for this species over the past decade at 1,658 fish (Table 2, Appendix A12), exceeding the 20-year average of 1,400. Virtually the entire catch came from the Southern District and can be primarily attributed to enhanced production at Halibut Cove Lagoon. Set gillnetters accounted for about 85% of the LCI Chinook catch, considered around the normal proportion for that gear group, with purse seiners taking the remaining 15%.

### **Sockeye Salmon**

The 2004 sockeye salmon harvest of 130,000 fish (Figure 9, Table 3) was the lowest for LCI since 1994, representing less than half the 20-year average of 283,500 (Appendix A13). Despite accounting for less than 5% of the LCI salmon harvest in total numbers of fish, which is significantly less than the traditional average, sockeyes still provided about 40% of the exvessel value of the entire salmon fishery this season (Table 7). The 2004 LCI commercial sockeye harvest was characterized by weak returns to virtually all enhanced systems. Natural returns to systems within the management area were considered fair to good, with one of those in East Nuka Bay of the Outer District contributing to seine harvests. As has been the case during past seasons, non-local stocks were thought to have intermixed with local stocks while migrating through the Southern District terminal harvest areas, providing additional sockeyes for harvest there.

Returns to enhancement sites, which typically provide the bulk of the LCI sockeye catch, were mostly poor in 2004, as expected. In the Southern District, harvests of enhanced runs of sockeye salmon returning to Leisure and Hazel Lakes were predicted to cumulatively total only about 24,000 fish. However, the estimated combined harvest total of over 34,600 fish (Figure 10, Appendix A15) produced as a result of these two enhancement projects was greater than the preseason forecast but still well below the recent 10-year average of 170,000. This year's harvest figure represents the lowest combined total since adults began returning to both the Leisure and Hazel Lakes enhancement sites in 1991 (prior to that year, only Leisure Lake sockeyes contributed to the harvests) and can be attributed to low stocking levels in 2001.

Also in the Southern District, the sockeye return to English Bay Lakes was expectedly weak but still achieved the desired inriver return, while providing a modest harvestable surplus of about 2,600 sockeyes to the commercial set gillnet fishery and over 3,000 fish for subsistence set gillnetters. The continued viability of the sockeye return to this system may rest on the future

success of the ongoing rehabilitation project originally initiated by ADF&G in the late 1980's and presently being conducted by Chugach Regional Resources Commission (CRRC) in conjunction with NSEP, operated by the village of Nanwalek. This sockeye project has encountered setbacks in recent seasons due to viral and disease outbreaks in the pen rearing of juveniles, as well as unexpected adult behavior that resulted in the failure to collect any broodstock in 2001 and difficulty in collecting broodstock in 2003. Additionally, because the long-term rearing of juvenile sockeyes in waters containing actively spawning adult sockeyes violates state fish culture and disease policy, ADF&G required that NSEP discontinue this practice in English Bay Lakes after the 2003 season. For the 2004 season, fry were reared at Port Graham Hatchery and released back into the English Bay Lakes system in mid-August.

In the Kamishak Bay District, the enhanced return to Kirschner Lake produced a catch of over 16,000 sockeyes (Table 3), surpassing the preseason harvest forecast of 12,000 fish, but all fish were utilized for hatchery cost recovery. In an unanticipated departure from recent years, targeted fishing effort was allowed on sockeyes returning to Chenik Lake in the Kamishak Bay District for the first time in over a decade. Returns to that system had been poor due to the after-effects of an outbreak of IHN, a naturally occurring viral disease, in the early 1990's. The outbreak caused increased mortality to young salmon, subsequently resulting in weak adult returns, and CIAA ultimately suspended the stocking program at Chenik Lake after the 1996 season. The sockeye return to Chenik this year, the second consecutive unexpectedly good return, was easily the strongest since 1993, with a total estimate of over 50,000 sockeyes, consisting of a commercial seine harvest of more than 33,000 fish and an approximate escapement of 17,000 (Appendix A16). It is interesting to note that all adults returning to Chenik Lake in 2004 were the result of natural production since the stocking program has not been conducted since 1996.

At Bear Lake in Resurrection Bay of the Eastern District, the cumulative commercial seine catch of "early run" sockeyes totaled 16,600 fish (Table 3), falling well short of the preseason harvest forecast of 40,000 sockeyes. Despite the shortfall, the desired inriver sockeye return for Bear Lake was achieved.

The LCI management area has only four lake systems with significant naturally occurring sockeye salmon runs, and all four achieved or slightly exceeded their sustainable escapement goals (SEG's) in 2004. In the Outer District, Delight Lake escapement, enumerated via a picket weir and aerial surveys, achieved its goal of 6,000 to 12,600 sockeyes with an estimate of 7,300 fish (Appendix A23), while the peak daily aerial survey escapement estimate at nearby Desire Lake totaled 10,700 sockeyes. The seine fleet harvested about 11,000 fish (Table 3) from returns bound for these two systems in East Nuka Bay. Waters of Aialik Bay in the Eastern District were kept closed to fishing in 2004 due to sluggish escapement, but a late surge of fish caused the final estimate of escapement at Aialik Lake to spike to over 10,000 fish, slightly exceeding the SEG range of 3,700 to 8,000 sockeyes (Table 3, Appendix A23). At Mikfik Lake in the Kamishak Bay District, a strong return resulted in an escapement estimated at 14,000 sockeyes (Table 3, Appendix A23), but no seine effort occurred despite continuous fishing time allowed in June. A fifth LCI lake known as Delusion (Ecstasy) Lake is a recently formed glacial system in East Nuka Bay of the Outer District that supported no documented salmon run prior to the mid-1980's. Sockeye returns to this system had a peak aerial escapement estimate of 1,000 sockeye salmon in 2004.

## **Coho Salmon**

The coho salmon resource in the LCI management area is not extensive, and as a result this species rarely attains commercial prominence. The 2004 commercial harvest of 12,400 coho salmon (Table 4) was the highest LCI total for this species since 1998, slightly more than the average catch during the past ten years (Appendix A17). Unusually, the majority of the harvest was split between the Eastern and Kamishak Bay Districts at 45% and 43%, respectively. Normally, the greatest proportion of the LCI coho harvests result from a combination of hatchery cost recovery operations at Bear Lake and entries into the Seward Silver Salmon Derby, both in Resurrection Bay of the Eastern District, but in 2004 the late season effort directed primarily at chums in Kamishak Bay also fostered minor additional effort targeting cohos. The remainder of the LCI coho catch was split between set gillnetters (9%) and seiners (2%) in the Southern District, with seiners in the Outer District catching a negligible number. Because the coho resource in LCI, and assessment of it, is limited, commercial coho harvests can sometimes be used to gauge coho run strength. However, market conditions in recent years have discouraged directed effort, making the incidental commercial harvest of this species an unreliable indicator. Sport and personal use harvests generally provide the best indicators of run strength. The reasonably good commercial catches, and other informal signs, suggested that returns during 2004 were likely average. The single aerial survey flown specifically for coho salmon assessment at Clearwater Slough in the Northshore Subdistrict of the Southern District resulted in a peak daily index count of 1,100 cohos, recorded on September 8, and was considered good by historical standards.

## **Pink Salmon**

Returns of pink salmon, usually the dominant species in numbers of commercially harvested salmon in LCI, were considered generally good this year, with an overall harvest of over 2.5 million fish (Figure 11, Table 5). This number represents the highest commercial catch since 1997 and the third highest over the past 20 years (Appendix A18). However, harvests this year were comprised mainly of fish returning to the two major hatchery facilities in LCI and were used primarily for hatchery cost recovery purposes. Although sufficient to achieve escapement goals, most natural returns were weaker than predicted and failed to produce any significant harvests.

The majority of the pink salmon catch this season was taken in the Southern District (Table 5, Appendix A18) as a direct result of Tutka and Port Graham Hatcheries' production, but virtually all of this district's total was utilized for hatchery cost recovery (Tables 1, 5, and 9). Port Graham Hatchery took an additional 69,500 pinks, not accounted for in commercial catch totals, for hatchery broodstock purposes (Tables 5 and 9). The estimated overall Tutka Hatchery return, including escapement into Tutka Creek, hatchery harvest, commercially harvested fish, and sport harvest, was 1.196 million pinks (Table 9), substantially exceeding the preseason projection of over 637,000 fish. The 2004 estimated survival rate of nearly 2% was considerably higher than the previous three seasons and near the long-term average for the facility. As stated previously, because CIAA announced that operations at Tutka Hatchery were being suspended, no broodstock was collected in 2004. At Port Graham Hatchery, the return was also much better than expected, with an estimate of about 1.358 million fish, nearly all of which were taken for hatchery cost recovery and broodstock.

The Outer District produced the greatest contribution of naturally produced pinks to LCI catches, with a total harvest of approximately 43,000 fish (Table 5, Appendix A18). Over 95% of the

Outer District harvest was incidental catch taken during efforts directed at chum salmon in Port Dick Subdistrict. In the Kamishak Bay District on the west side of LCI, the paltry pink salmon harvest of 13,000 fish (Table 5, Appendix A18) all came as incidental catch during directed efforts targeting chums in the northern half of the district. Pink salmon escapements to most systems within the management area, with the notable exception of Port Dick (head end) Creek, were sufficient to achieve SEG's (Appendix A24) but few exhibited significant surpluses.

### **Chum Salmon**

The 2004 commercial chum salmon harvest of nearly 207,000 fish (Table 6), which was more than seven times the recent 10-year average (Figure 12, Appendix A21), was the highest catch for this species since 1988 and the third highest since statehood, maintaining a five-year trend of good catches in LCI. The harvest was not surprising based on the recent pattern of comparatively strong returns and concurrently good escapements, especially to systems in Kamishak Bay. Virtually the entire Kamishak District harvest, totaling 177,000 chums this season, was taken in the northern end of the district by effort targeting another exceptional Cottonwood Creek return. Additionally, for the first time in over a decade, effort targeting chum salmon returns to Port Dick in the Outer District was allowed, resulting in a district-wide harvest of almost 28,000 fish. All chum systems achieved their SEG's as a result of the reasonable returns, with the exception of McNeil River in the Kamishak Bay District, which failed to attain its SEG range for the twelfth time in the past 15 years (Appendix A25).

### **2004 EXVESSEL VALUE**

The estimated exvessel value of the 2004 commercial salmon harvest in LCI, not including any postseason adjustments in price paid to fishermen, was approximately \$1.27 million (Table 7, Appendix A2), making it the second lowest during the past decade. This depressed value was undoubtedly due to the poor catch of sockeye salmon. Purse seine gear in the common property fishery, which normally accounts for the majority of the catch and value, comprised about \$0.7 million or 55% of the overall exvessel total (Table 7), while set gillnets accounted for \$146,000 or 12%. An estimated \$342,000, or about 32% of the entire exvessel value of the LCI salmon fishery, was utilized for hatchery cost recovery purposes, while the remaining 1% consisted of cohos entered into the Seward Silver Salmon Derby and subsequently sold by event organizers. Estimated average prices paid to fishermen in 2004, not including any postseason adjustments, were as follows: Chinook – \$1.56/pound; sockeye – \$0.77/pound; coho – \$0.47/pound; pink – \$0.04/pound; and chum – \$0.20/pound (Table 10, Appendix A3). Prices for all species increased over the previous two seasons, with the exception of pink salmon, the price for which fell to an all-time low.

### **2004 DISTRICT INSEASON MANAGEMENT SUMMARIES**

#### **Southern District**

##### **Set Gillnet Fishery**

An Area H commercial set gillnet permit is valid for fishing in any part of Cook Inlet (Upper or Lower), but there are only five beach areas in LCI, all located along the south shore of Kachemak Bay in the Southern District, where set gillnets may be used during open fishing periods (Figure 2). The limited area provides only enough productive fishing sites to accommodate approximately 25 set net permits.

The 2004 LCI all-species set gillnet harvest totaled 21,000 fish, less than 30% of the recent 10-year average (Appendix A7) and the lowest all-species total since the early 1960's. The sockeye catch of only 16,000 fish was the lowest since 1994 and was less than half of the average over the past decade. For comparison, species composition in 2004, with sockeyes at 78% and pinks at 4%, was considerably different than that of the past decade, where typical species composition in the commercial set gillnet fishery was 57% sockeyes, 32% pinks, 6% chums, 3% cohos, and 2% Chinooks. Catches of Chinook salmon, at 1,400 fish, were slightly greater than the recent 10-year average of 1,200. Enhancement efforts, directed primarily at recreational fisheries in Halibut Cove Lagoon and secondarily in Seldovia Bay, were predominantly responsible for the commercial gillnet Chinook catch during 2004.

Based on the weak preseason forecast for sockeyes returning to English Bay Lakes, the commercial set gillnet fishery in the Port Graham Subdistrict, including both the English Bay and Port Graham Sections, was kept closed at the beginning of the season to protect fish for escapement. The return proved marginally stronger than anticipated, and once achievement of the SEG could be projected, commercial set gillnetting in Port Graham was opened to fishing on the regular schedule of two 48-hour periods per week beginning July 1. Although relatively late in terms of the traditional English Bay Lakes sockeye run timing, the opening resulted in a commercial set gillnet harvest of around 2,700 sockeyes in the two sections (Table 3). The desired inriver return of 7,300 to 15,000 sockeyes was slightly exceeded (Appendix A23), while local fishermen from the villages of Nanwalek and Port Graham caught over 3,500 sockeyes for subsistence needs. This situation was similar to the 2000 and 2001 seasons, when complete fishing closures or severe restrictions were implemented due to weak sockeye returns.

After the English Bay Lakes sockeye return was over, waters of Port Graham Subdistrict remained open to commercial set gillnet fishing despite a Port Graham Hatchery pink salmon forecast suggesting that all returning fish would be required to meet hatchery cost recovery and broodstock requirements. The anticipated amount of gillnet effort, as exemplified by the past several years, was not expected to pose a threat to either the hatchery pink return or the natural return to nearby Port Graham River. The hatchery return proved considerably stronger than predicted, but no set gillnet effort occurred after the sockeye return was over. Although the pink salmon cost recovery goal for Port Graham Hatchery was not met, broodstock and egg take goals were achieved, while escapement of pinks into Port Graham River exceeded the SEG for that system (Appendix A24).

LCI set gillnet fishing effort in 2004 was down from the previous two years, with a total of 19 permits actively fished. This figure was less than both the recent 20- and 10-year averages (Appendix A1).

## **Seine Fishery**

### ***Sockeye Salmon***

The overall catch of sockeye salmon by all gear types in the Southern District, at 51,000 fish, was the lowest for this species since 1986 (Appendix A13) and was less than one-fourth of the recent 10-year average. Purse seiners in the common property fishery accounted for about 43% of the sockeye salmon landed in the district in 2004, or approximately 22,000 fish, while an additional 13,000 sockeyes (26%) were harvested by purse seine for hatchery cost recovery (Table 1). The low harvest can be attributed to an almost complete lack of stocking in 2001, when a total of only 89,000 sockeye salmon fry were released into Leisure Lake and no fry were

released into Hazel Lake and English Bay Lakes. This figure compares with an average cumulative total of 3.1 million sockeye fry stocked into these systems during the past decade (excluding 2001). Meager adult sockeye returns and commercial catches in 2004 reflected the consequences of the low stocking levels.

As in recent years, waters of Halibut Cove Subdistrict, as well as the outer waters of China Poot Bay and Tutka Bay Subdistricts, were opened to seining five days per week beginning Monday, June 21, to target enhanced sockeye returns to Leisure and Hazel Lakes. Within these subdistricts, however, waters of the China Poot and Hazel Lake Special Harvest Areas (SHA's; Figure 3) were opened only to authorized agents of CIAA at this time, seven days per week, for the express purpose of hatchery cost recovery. Traditionally, the SHA's remained closed to the common property commercial fishery until the preseason revenue goal established for each SHA was achieved.

Preseason combined harvest projections for returns to the Leisure and Hazel Lakes' stocking sites were estimated at only 24,000 sockeyes. The actual commercial harvest of adult fish produced as a result of the two enhancement projects was estimated at 34,600 fish (Figure 10, Appendix A15), comprising just over one-fourth of the entire LCI sockeye salmon harvest (Table 3). Because of the close geographic proximity of these two projects, the overlapping area of harvest, and the lack of tagging, no definitive assessment of separate returns to each system can be established. However, fish returning as a result of these two projects not only contributed to seine catches in China Poot Subdistrict but also to those in adjacent Halibut Cove and Tutka Bay Subdistricts. It was estimated that personal use dip net and sport fishermen harvested another 4,900 sockeyes at the head of China Poot Bay based on average catches from the early 1990's. The 2004 total cumulative return from both projects was estimated at slightly less than 41,000 sockeyes (Appendix A15), making it the smallest combined return of sockeyes to the two systems since adults began returning to Hazel Lake in 1991.

As outlined in the Trail Lakes Hatchery Annual Management Plan (AMP) prior to the season, the CIAA revenue goal necessary to meet operational expenses incurred in LCI sockeye salmon lake stocking projects was set at \$132,000 this year. CIAA acknowledged prior to the season that attainment of the goal was unlikely given the weak forecast, and because of this a common property seine opening inside the SHA's was not probable during the season. In most years, CIAA would attempt to divide the cost recovery revenue goal between the Southern District and Kamishak Bay District SHA's, with a higher proportion expected to come from the combined China Poot and Hazel Lake SHA's, both in the Southern District, and the remainder from the Kirschner Lake SHA in the Kamishak Bay District, based on the projected returns to those respective sites. The weak forecast made this split impractical in 2004. Nonetheless, cost recovery harvests inside the China Poot and Hazel Lake SHA's (Figure 3) were to proceed at CIAA's discretion since the areas were expected to remain closed to common property fishing for the entire season. Even if CIAA harvested the entire projected return of 24,000 sockeyes from the China Poot and Hazel Lake SHA's, the expected revenue, assuming an average price of \$0.50 per pound and an average weight of 4.0 pounds per fish, would be insufficient to achieve the traditional 80% combined goal of \$105,600 for these two areas. As previously described, these SHA's were to remain closed to common property seining for the entire season, unless the combined goal established for the two areas was achieved.

Similar to the 2001 and 2002 seasons, CIAA contracted a small group of LCI seiners to conduct cost recovery within the Southern District SHA's. This differed from 2003 and years prior to

2001, when CIAA contracted the Cook Inlet Seiners Association (CISA) to undertake sockeye cost recovery in LCI, with the latter organization relying on the use of volunteer vessels to undertake hatchery harvest. The first hatchery harvest in the China Poot Subdistrict occurred on June 25 in the China Poot SHA, netting about 2,800 fish. This harvest was considered early by historical standards, suggesting that the return might be stronger than forecasted. Unfortunately, vessels participating in the common property fishery outside the SHA's were experiencing poor catches, reporting that numbers of fish present in area waters were small. Although the inseason contract price for cost recovery sockeyes had dropped to \$0.44 per pound, this low price was offset by a higher than expected average weight of about 5.5 pounds per fish.

Due to the weakness of the return, the traditional buildup of sockeyes within the China Poot SHA never materialized in 2004, and as a result only three more harvests took place there, with the last coming on July 9. Buildups in the Hazel Lake SHA were marginally better, and a total of five separate harvests occurred in that SHA between July 8 and 15. The peak daily hatchery harvest of the season occurred on July 12 when over 4,700 fish were taken in the Hazel Lake SHA. The cumulative reported catch in the China Poot and Hazel Lakes SHA's was just under 13,000 sockeyes, totaling just over 68,000 pounds. These figures translated into approximately \$30,000 revenue for the season, or less than one-third of the goal established for the Southern District SHA's. As expected, neither of the aforementioned SHA's was ever opened to common property seining during 2004.

Common property seine catches in China Poot Subdistrict, outside of the SHA's, remained weak throughout the season. Daily catches in the Neptune Bay Section peaked on July 6 when 2,400 sockeyes were taken, while China Poot Section catches peaked on July 1 with 2,700 sockeyes. The poor catch rates in both sections outside the SHA's caused effort to diminish much earlier than normal, with the final landings coming on July 7 in the China Poot Section and July 19 in the Neptune Bay Section. The cumulative common property seine catch in the two sections totaled only about 20,000 sockeyes in 2004 (Table 3), taken by an estimated 16-18 seiners. Approximately two-thirds of this harvest, or about 13,800 sockeyes, was taken in the China Poot Section, suggesting that the Leisure Lake sockeye return was stronger than the Hazel Lake return.

Very little seine effort for sockeyes occurred within adjacent waters of Tutka Bay Subdistrict to the southwest of the China Poot Subdistrict, or within the Halibut Cove Subdistrict to the northeast of the China Poot Subdistrict, resulting in an additional harvest of only around 1,200 fish (Table 3) for these two areas.

### ***Pink Salmon***

Returns of pink salmon to the Tutka Bay and Port Graham Hatcheries contributed to an overall (all gear types) Southern District harvest of 2.46 million pinks (Table 5, Appendix A18), nearly double the recent 10-year average and considerably greater than the preseason hatchery-only harvest forecast of 1.38 million fish. Of the pink harvest in the district, seiners in the common property fishery took a negligible total, while hatchery cost recovery accounted for virtually all of the harvest.

Waters of Tutka Bay Subdistrict outside of Tutka Bay proper first opened to commercial seining five days per week beginning June 21, as has been the case in recent years. The open waters consisted of those waters offshore of a line running from the "rock quarry" on the north shore of Tutka Bay to the Tutka Bay Lodge on the south shore (Figure 4). Waters within the Tutka Bay SHA (Figure 4) were open to hatchery cost recovery harvest by authorized agents of CIAA on a



continuous basis, as established in the Tutka Hatchery Annual Management Plan (AMP), beginning June 21. Since CIAA had announced a suspension of operations at Tutka Hatchery, no broodstock would be collected in 2004, thus all fish excess to natural escapement requirements were to be harvested for cost recovery to help offset operational expenses. Also, because Tutka Hatchery had been operating at a deficit for a number of years, the revenue goal for the season was set at \$1.18 million for FY04, meaning that all fish returning to the hatchery would be required for this purpose. A range of 12-19,000 pinks was needed to meet the sustainable escapement goal established for Tutka Creek. If achievement of the aforementioned goals could not be projected by July 5, a certainty based on the forecast, additional common property fishery restrictions within Tutka Bay Subdistrict would be implemented as outlined in the Tutka Hatchery AMP.

The contracted hatchery cost recovery vessels and crews were available and ready to begin fishing in late June, with the first harvest occurring on June 29. Once again, three cost recovery vessels were employed this season, and the hatchery harvest strategy was designed to encourage as much fishing outside of Tutka Lagoon as possible in order to promote product quality and reduce the logistical difficulties of moving tender vessels through waters of the shallow access channel connecting the lagoon to Tutka Bay proper. Day-to-day operations of the catcher boats and tenders were adjusted depending on fish returns, tides, and weather.

Initial cost recovery catches showed promise, averaging over 33,000 pinks per day during the first four days of active harvest, suggesting that the hatchery return might be stronger than predicted. As expected, no common property effort directed at Tutka pinks had yet occurred, and attainment of hatchery goals could not be projected by July 4. As a result, the common property seine closure line in Tutka Bay Subdistrict was moved seaward beginning July 5 to discourage effort on this stock and allow as many fish as possible to reach waters near the facility.

The hatchery cost recovery vessels reported deliveries on a total of 17 days between June 29 and August 6. The peak daily cost recovery harvest of the season occurred on July 18, with a total of 170,500 pinks taken, while daily catches averaged about 69,000 pinks for each day fished during the season. Pinks harvested for cost recovery averaged almost 3.2 pounds per fish, slightly greater than the expected average weight of 2.85 pounds. Waters of Tutka SHA were never opened to common property seining at any time during the 2004 season. The cumulative hatchery cost recovery catch totaled 1.175 million pinks for the season (Table 9). The overall value of the harvest was only about \$75,000 (Table 7), substantially short of the revenue goal of \$1.18 million. Again, no fish were collected for hatchery broodstock.

The weak markets and low price provided no incentive for seiners in the common property fishery to target pinks destined for Tutka Hatchery, and as a result the seine fleet took less than 800 pinks in Tutka Bay Subdistrict during 2004. The estimated pink salmon escapement of 18,000 fish into Tutka Creek (Table 5, Appendix A24) fell near the upper end of the system's SEG range of 12-19,000 fish. The total return of pinks to Tutka Hatchery, including commercial, cost recovery, and sport harvest, as well as escapement, was estimated at 1.196 fish (Table 9), exceeding the preseason forecast by almost 90%.

At Port Graham in the Southern District, a spring 2003 fry release of about 57.2 million pinks from Port Graham Hatchery was expected to produce an adult return with a mid-point of about 742,000 fish this season. With a hatchery broodstock goal of 191,000 fish, the Port Graham Hatchery Corporation (PGHC) anticipated a harvestable surplus of approximately 551,000 pinks. Using an

average weight of 3.2 pounds per fish and an average mid-point price of \$0.09 per pound, harvest of all available fish would likely be necessary in pursuit of the established hatchery revenue goal of \$400,000. Thus, no directed common property effort or harvest was expected.

Since the Port Graham Hatchery pink salmon broodstock goal of 191,000 fish (of hatchery origin) seemed attainable based on the forecast, the capture of wild stock fish near the mouth of or within nearby Port Graham River, for use as hatchery broodstock, would not be necessary. Nonetheless, a hatchery egg removal schedule for Port Graham River was summarized in the AMP as a contingency. The forecast for the wild stock return to Port Graham River was estimated at nearly 52,000 pinks, exceeding the SEG range of 7,000 to 20,000 fish. However, that forecast figure was based on good parent year escapement but did not account for the severe flooding experienced throughout the Kenai Peninsula during the fall of 2002. Given the low price and weak markets for pinks, no commercial set gillnet fishing effort on pinks returning to Port Graham Bay was expected despite the open season, and a closure of the set gillnet fishery was not anticipated unless hatchery and/or escapement requirements appeared in jeopardy.

The first ground survey of Port Graham River confirming the presence of pink salmon was completed on July 19, but counts numbered less than 150 fish. The next survey's total on July 26 showed only 400 pinks in fresh water. Department aerial surveys near the end of July documented significant numbers of pinks staging in waters adjacent to the hatchery net pens, located at the source of fresh water for imprinting purposes, and near Duncan Slough, adjacent to the hatchery facility. Such observations annually imply that these fish are primarily of hatchery origin. In order to allow PGHC to initiate cost recovery operations and broodstock collection, waters of the Port Graham SHA (Figure 6) east of the U.S. Coast Guard navigational buoy were opened to harvest by authorized agents of PGHC on a continuous basis beginning July 31. Restricting PGHC to this relatively small area was felt to provide sufficient protection to natural-stock fish bound for Port Graham River while still allowing the hatchery opportunity to pursue its objectives. Further manipulation of time and area within the SHA would be considered in order to secure escapement and/or hatchery requirements.

Hatchery cost recovery efforts in the Port Graham SHA began on August 4 with a catch of 61,000 pink salmon. Harvests continued on an almost daily basis through the month of August, with the final harvest occurring on August 28. The peak daily catch occurred on that final day at 101,500 fish, with an average of over 64,000 pinks reported per day actively fished during the month. The overall cost recovery harvest of pink salmon by Port Graham Hatchery totaled 1.283 million fish, worth an estimated \$287,000 or about 72% of the established revenue goal. Broodstock efforts netted an additional 69,500 pinks (Table 5), bringing the cumulative return of pink salmon to Port Graham Hatchery to approximately 1.353 million fish, or over 80% greater than the preseason forecast. The final escapement into Port Graham River, estimated at 44,000 pinks (Table 5, Appendix A24), was more than twice the upper end of the established SEG range. The commercial set gillnet fishery in Port Graham Subdistrict remained open to fishing on a schedule of the two standard 48-hour weekly fishing periods for the duration of the pink salmon return, but a lack of interest and low prices for pinks resulted in no effort or harvest.

Returns of wild pink salmon stocks to other systems in the Southern District, as indicated by ground survey escapement counts, were generally fair to good, but after the recent trend of erratic and mostly weak returns to area systems, no directed seine openings were allowed. As a result, pink escapements into all Southern District systems fell within established SEG ranges, except that of Seldovia River where the escapement exceeded the upper end of its range (Table 5, Appendix A24).

### ***Other Species***

The Southern District chum salmon harvest cumulatively totaled less than 1,400 fish for all gear types, the lowest total on record for the district (Table 6, Appendix A21). Seiners took only about 10% of the total, with set gillnetters accounting for the remainder. Catches from Tutka Bay Subdistrict dominated the all-gear-types totals (Table 6) at about 53% of the district-wide harvest, but seine catches of chums were highest in the Neptune and China Poot Sections of China Poot Subdistrict, undoubtedly as incidental catch during efforts targeting sockeyes returning to those two stocking sites. Escapements into Southern District chum systems were generally fair to poor, and an escapement within the SEG range was not achieved at Port Graham River (Appendix A25). Seldovia River, with no formal SEG, experienced a weaker chum return than the previous three seasons, with a final escapement totaling 2,500 fish.

Although minor in total numbers of fish, the majority of the Southern District Chinook harvest usually consists of incidental catches of adult fish returning to three separate enhancement projects. The 2004 Southern District harvest of 1,660 Chinooks by all gear types was the highest since 1999 and was about 20% greater than the recent 10-year average of 1,370 fish (Appendix A12). Seiners took approximately 15% of the Southern District Chinook total this season, estimated to be near the normal proportion for this gear type, with set gillnetters harvesting the remainder. The district-wide coho salmon catch of 1,400 fish by all gear types was only about 37% of the recent 10-year average (Appendix A17), with seiners accounting for less than 20% of the total and set gillnetters taking the rest (Table 1).

## **Kamishak Bay District**

### **Sockeye Salmon**

The entire Kamishak Bay District, with the exception of Chenik Subdistrict, opened to salmon seining by regulation on June 1. For the fifth consecutive year, waters of Paint River Subdistrict were included in this district-wide opening because the stocking program at Paint River Lakes has been discontinued (except for an experimental, one-time-only stocking in 2002), and once again few if any sockeyes were expected back to that location this season. The weekly fishing schedule for open waters within the district was set at seven days per week for the sixth successive year. This schedule was originally implemented because the complexion of the fishery had evolved since 1994, when fish processors ended the routine practice of stationing a tender(s) in this remote district at the start of each season. As a result, effort and ensuing catches declined as fishermen were forced to devise their own transport of all salmon harvested. Recognizing this shift in effort levels, as well as the harsh weather that typically limits effective fishing activity, the staff reasoned that opening waters of Kamishak Bay District to commercial seine fishing seven days per week would allow opportunity to harvest salmon without unduly jeopardizing spawning escapement requirements.

The earliest natural sockeye salmon return to the management area, at Mikfik Creek in the McNeil River Subdistrict, appeared to be slightly later than normal, with the first fish of the season observed via aerial survey on June 8. At only 175 fish, this first indication suggested that the run could be weak. Numbers built rapidly over the next week, with 7,400 sockeyes estimated in fresh water on June 14. The peak daily survey estimate of the season came on June 21 when just over 14,000 sockeyes were estimated. Despite the continuous fishing time allowed in McNeil River Subdistrict, no effort directed at Mikfik sockeyes occurred this season and therefore no harvest was recorded. Run timing for the Mikfik sockeye return was considered

later than normal based on historical standards. No increase in escapement was detected after the June 21 survey, and the fresh water total from that survey was used as the final estimated escapement index (Table 3, Appendix A23), slightly exceeding the established SEG of 6,300 to 12,150 fish.

After the Mikfik sockeye return, seiners would next normally turn their attention to the Chenik or Douglas River Subdistricts during the final days of June. Although the stocking program at Chenik Lake had been suspended, and sockeye returns to the system had been minimal in the late 1990's and early 2000's due to the lingering effects of an IHNV outbreak in previous years, a surprisingly strong return in 2003 left the outlook for 2004 uncertain. Aerial surveys began to detect an unexpectedly large buildup of fish in salt waters of Chenik Lagoon on June 21 with an estimate of 2,500 sockeyes. The next survey on June 25 estimated an identical number, but marginal observation conditions implied that this was a minimal estimate based on the amount of jumper activity noted. Historical run timing for the Chenik sockeye stock indicated that the return was in its earliest stages, suggesting a return strong enough to sustain commercial exploitation without jeopardizing escapement. As a result, waters of Chenik Subdistrict were opened to seining five days per week beginning June 28. The typically harsh weather conditions in Kamishak Bay, as well as marker placement around the creek mouth, were expected to limit fishing activity and allow adequate numbers of fish into fresh water.

Catches in Chenik Subdistrict during the first days after the opening were strong, cumulatively totaling nearly 11,000 sockeyes for the first deliveries on June 30. A weather forecast calling for continuation of uncharacteristically mild weather was expected to allow sustained fishing activity. Despite the strong showing of fish, as well as a series of high tides that should have aided fish in ascending the small set of "step" falls at tidewater, sockeye escapement was sluggish, and through July 4 no fish had been documented in fresh water at Chenik Lake. Additionally, a series of exceptionally low tides was approaching, which could leave fish vulnerable to harvest by forcing them out from waters protected by regulatory markers. Therefore, in an effort to protect fish for escapement, waters of Chenik Subdistrict were closed to seining beginning July 5.

Department aerial surveys to monitor escapement into Chenik Lake continued after the closure, and on July 12 approximately 2,500 sockeyes were observed in fresh water. However, this estimate was considered minimal due to very windy conditions, and the actual number was believed to be higher. Since this figure fell within the established SEG range of 1,900 to 9,300 sockeyes for Chenik Lake, and because a large buildup of sockeyes totaling 12,000 fish was estimated behind the markers in Chenik Lagoon on the same survey, the fishery was reopened on a five-days-per-week basis beginning July 13 to allow seiners opportunity to harvest surplus fish while still allowing for limited escapement over the duration of the return.

Catches in Chenik Subdistrict after it reopened were expectedly strong, cumulatively totaling 13,000 sockeyes for the first deliveries. Escapement also continued to build, and by July 19 an estimated 13,000 sockeyes had moved into fresh water. Since this figure exceeded the upper end of the SEG for Chenik Lake, regulatory markers protecting the creek mouth at tideline were repealed, and fishing allowed on a continuous basis, beginning July 20. Seiners quickly took advantage of the liberalized opening and harvested much of the available surplus. The last reported delivery of Chenik sockeyes was made on July 23, and the cumulative harvest for the season totaled over 33,000 fish (Table 3). Department aerial surveys of Chenik Lake continued into early August, and the peak daily survey estimate of 17,000 sockeyes made on August 3

served as the final index estimate of escapement (Table 3, Appendix A23). This figure represented the highest escapement estimate for Chenik Lake since 1990 and, when combined with the commercial catch, the largest overall return of sockeyes to the Chenik Lake system since 1991 (Appendix A16).

Only minimal effort directed at sockeyes occurred in the Douglas River (Silver Beach) Subdistrict, resulting in a cumulative harvest of 2,100 fish (Table 3). Apparently the low numbers discouraged any further effort in this subdistrict during 2004.

The next sockeye return in Kamishak Bay District was to Kirschner Lake in the Bruin Bay Subdistrict, the site of a traditional sockeye salmon lake stocking project. A similar project at nearby Bruin Bay Lake was discontinued after 1996, thus no fish were expected to return to that site this season. At Kirschner Lake, where a steep falls at tideline precludes escapement into the lake, a weak return of only 12,000 sockeyes was predicted. As outlined in the Trail Lakes Hatchery Annual Management Plan (AMP) prior to the season, the revenue goal necessary to meet operational expenses incurred in all LCI sockeye salmon lake stocking projects was set at \$132,000. This amount was to be split between the Southern District SHA's (Leisure/Hazel Lakes, Figure 3) at 80% of the total and the Kamishak SHA (Kirschner Lake, Figure 5) at 20%, but once again the preseason forecast for enhanced LCI sockeye returns suggested that attainment of the revenue goal was improbable. CIAA anticipated harvesting the entire return of sockeyes to Kirschner Lake for cost recovery purposes; therefore no directed common property effort on this stock was likely.

Preseason management strategy for the Bruin Bay Subdistrict, as outlined in the Trail Lakes Hatchery AMP, was to open the Kirschner SHA to hatchery cost recovery fishing on a continuous basis beginning June 21 while simultaneously closing it to common property seining. The intent was to allow opportunity for CIAA to harvest fish for cost recovery without competition from the seine fleet. If the goal was met or could be projected, the SHA was to be closed to cost recovery harvest and opened to commercial seining so the fleet could work the area uninhibited for the remainder of the season.

CIAA had made arrangements prior to the season for a CISA vessel to conduct cost recovery in Kamishak Bay. Initiation of cost recovery fishing generally requires a substantial buildup of fish in salt water near the Kirschner falls, and 2004 was no exception. The first effort occurred in the Kirschner Lake SHA on July 14, netting an estimated harvest of nearly 7,200 fish. Fortunately, the inseason contract price for Kirschner sockeyes, at \$0.44 per pound, was almost twice the preseason projection, but despite the increase, it remained readily apparent that the hatchery revenue goal would not be achieved given the forecasted return. Only one more cost recovery harvest occurred, on July 29, bringing the cumulative catch for the season to 16,400 sockeyes (Table 3) with an estimated value of around \$30,000. The total return to Kirschner Lake was estimated at slightly more than 17,000 sockeyes (including unharvested fish), or more than 40% greater than the preseason prediction for the system. The Kirschner Lake sockeye enhancement project has remained one of LCI's steadiest producers.

### **Pink Salmon**

Preseason pink salmon projections for the Kamishak Bay District in 2004 were quite positive, with a harvestable surplus totaling 786,000 fish forecasted for Bruin Bay Subdistrict and an additional 141,000 fish for Ursus Cove Subdistrict. Similar to other areas of LCI, however, it was unclear whether or not the severe flooding experienced throughout the Kenai Peninsula in

the fall of 2002 affected pink salmon systems on the west side of Cook Inlet. Aerial surveys of the district began to document pinks in fresh water during the middle part of July, but those early estimates suggested that the forecast appeared overly optimistic. As surveys continued through the remainder of the month and into August, observations revealed that pink returns were relatively modest, likely strong enough to achieve SEG's but certainly not sufficient to provide significant harvest opportunities.

Despite continuous openings in the vicinity of major pink salmon systems, the combination of modest returns, weak markets, and a lack of tender service insured that no directed effort occurred on Kamishak Bay pink salmon in 2004. The cumulative pink harvest for the season, totaling 12,000 fish (Table 5, Appendix A18), came entirely as incidental catch during effort directed at the strong chum salmon returns to Kamishak Bay. Two of the three major monitored pink systems in the district, Bruin Bay River and Brown's Peak Creek, fell within their SEG ranges (Table 5, Appendix A24), and while final pink salmon index of escapement at Sunday Creek slightly exceeded the upper end of its SEG range.

### **Chum Salmon**

For the fifth consecutive season, significant effort directed at strong chum salmon returns resulted in outstanding catches in the LCI management area. The final overall LCI catch of chums totaled 207,000 fish, with seiners in Kamishak Bay District taking over 85% of the total (Table 6, Appendix A21). The 2004 commercial chum harvest of over 177,000 fish in Kamishak Bay District was the second highest since statehood, surpassed by only that of 1988. Chum escapements throughout the district were once again generally strong, with the lone exception of McNeil River, where the escapement failed to achieve the goal range for the twelfth time in the past 15 years despite the absence of any directed fishing effort.

Aerial surveys to monitor chum returns in Kamishak Bay began in mid/late June, with the first chums of the season noted in McNeil River on June 21, considered quite early by historical standards. Because chum runs to McNeil River have not been strong over the past decade, waters of McNeil River Subdistrict were closed to commercial fishing as a precaution beginning June 23, even though no seiners were present in area waters. Escapement into McNeil River spiked slightly at the end of June but then remained relatively static for the remainder of the season. A daily aerial estimate of 6,500 chums on July 15 ultimately proved to be the season's peak. Post-season analysis of aerial survey data using the standard area under the curve (AUC) method yielded a final estimated escapement index at McNeil River of slightly over 11,000 fish, falling short of the SEG range of 13,800 to 25,800 and the smallest escapement since 1990 (Appendix A25).

Chum returns to nearly all other Kamishak Bay systems were strong. After four consecutive seasons of impressive chum returns, LCI seiners were anxious to see if the trend would continue in 2004. In the southern portion of the district, which had been opened to fishing seven days per week at the beginning of the season, aerial surveys indicated that chum returns to the Big and Little Kamishak Rivers held reasonable surpluses, but seiners apparently missed the peak of the saltwater migrations and only minor harvests resulted. Final escapement estimates of 58,000 chums into Big Kamishak River and 45,000 into Little Kamishak River (Table 6, Appendix A25) both exceeded the respective SEG's established for each system by substantial margins. Harvest from the Douglas River Subdistrict for the season totaled only about 6,700 chums (Table 6).

Following the same pattern as that in the Kamishak Rivers, central and northern Kamishak Bay chum returns were relatively strong this season. At Bruin Bay River, chums began to show in

fresh water in late June, continually building well into mid-July. The peak individual aerial survey of Bruin Bay River occurred on July 19, when over 8,500 chums were documented. In spite of the minimal seine effort directed specifically at this stock, the resulting harvest still totaled about 7,000 chums (Table 6), while the final estimate of escapement into Bruin Bay River was 16,000 chums (Appendix A25).

Because the run timing for the more northerly chum systems is later than that in southern and central Kamishak areas, aerial evaluation of northern Kamishak systems typically begins in late July, and this season fish were already in fresh water at that time. By August 3, good chum numbers were observed at Iniskin River and Cottonwood Creek, while those of Ursus Cove systems were lagging slightly. Nonetheless, all indicators pointed to strong returns given the date. Steady seine fishing effort began to target these returns, primarily that of Cottonwood Creek, at the end of July, and through August 9 a cumulative total of an astounding 50,000 chums had been reported from that system's subdistrict alone. Due to the good catch figures, and escapements that met or exceeded SEG's, the regulatory markers in Ursus Cove and Iniskin Bay Subdistricts were repealed beginning August 12 in order to allow additional opportunity for seiners to target the strong chum returns. At Cottonwood Creek, escapements were reasonable but were likely being slowed by the consistent commercial effort targeting this return, and given the already strong catches within the Cottonwood/Iliamna Subdistrict, the staff elected to leave the markers in effect there.

Despite continuous fishing time and absence of markers protecting other stream mouths, nearly all of the late season seine effort in northern Kamishak Bay was directed at the Cottonwood Creek chum salmon return, for good reason. Final harvest for the Kamishak Bay District for the season totaled over 177,000 chum salmon for the season (Table 6, Appendix A21), nearly 90% of which came from the Cottonwood/Iliamna Subdistrict. This figure was the second highest for the Kamishak Bay District since statehood, bested only by that of 1988. Interestingly, the five largest annual catch totals in this district since 1988 have all occurred during the past five years. Escapements at all Kamishak chum systems met their respective SEG's (Appendix A25), with the exception of McNeil River as stated earlier. The fifth successive season of strong district-wide returns was a continuing sign that the trend of weak chum salmon runs experienced in the 1990's has passed, and future returns will hopefully remain at these stronger levels.

### **Other Species**

Chinook salmon harvests in the Kamishak Bay District historically have been insignificant (Appendix A12). On the other hand, coho harvests within the district have at times been substantial, providing fishermen with some lucrative late season catches. Coho assessment in LCI is very limited, but early signs from other areas within LCI suggested that returns were average to slightly above average. Only minor effort was directed specifically at Kamishak Bay coho salmon in 2004, resulting in a district-wide harvest of 5,400 fish (Appendix A17). This total, which came almost exclusively from the Douglas River Subdistrict in southern Kamishak Bay, was the highest since 1995, breaking a series of eight consecutive seasons of negligible coho salmon catches in this district.

## **Outer District**

### **Sockeye Salmon**

Outer District sockeye salmon harvests have traditionally focused on natural returns to the Delight and Desire Lakes systems in East Nuka Bay Subdistrict. A lake stocking project in the Port Dick area during the late 1980's provided additional fish for harvest in the early 1990's, but stocking was discontinued after 1989 and a small harvest in 1993 was the last documented catch. Preseason projections, based solely on the long-term average catch, forecasted a harvest of up to 23,000 sockeyes for the entire Outer District this year. The actual harvest totaled 11,100 fish (Table 3), lower than the previous two seasons' harvests and less than 60% of the recent 10-year average (Appendix A13).

Aerial surveys to assess the Delight and Desire Lake systems in East Nuka Bay began on June 21, with good numbers of fish (3,250) documented at Desire Lake and smaller numbers of fish (900) observed at Delight Lake. The figure for Desire Lake was considered earlier than normal, potentially the sign of a strong return. The next aerial survey four days later showed that escapement had increased significantly at Desire Lake, with nearly 11,000 fish estimated in fresh water, while escapement appeared to be lagging at Delight Lake, with a total of around 1,900 sockeyes observed. Since the figure for Desire Lake fell near the midpoint of the SEG range of 8,800 to 15,200 sockeyes, waters of East Nuka Bay north of the latitude of James Lagoon were opened to commercial seining five days per week beginning June 28. In addition, regulatory markers protecting the mouth of Desire Lake Creek were rescinded during open fishing periods in order to allow additional opportunity to harvest surplus fish destined for this system. Marine waters of Delight Lake, south of the latitude of James Lagoon, were kept closed to fishing to protect fish for escapement since the SEG range for this system is 6,000 to 12,600 sockeyes.

The initial commercial seine catches in East Nuka Subdistrict on the first two days of the opening, at less than 800 sockeyes, suggested that the Desire Lake return was probably early but not as strong as initially hoped. During the first two weeks after opening, harvests in East Nuka Subdistrict remained relatively steady but cumulatively totaled only about 3,500 sockeyes. Meanwhile, sockeye counts in freshwater at Delight Lake were continuing to build during late June and early July. An aerial survey of the Delight Lake system on July 2 revealed about 4,000 sockeyes in fresh water and additional jumper activity noted, but poor survey conditions lead the staff to believe that actual escapement was considerably higher than the aerial estimates. Consequently, all waters of East Nuka Subdistrict were opened to seining five days per week beginning July 5. Markers protecting the mouth of Delight Lake Creek and Lagoon, as well as nearby McCarty Lagoon, remained in place for this opening.

Effort in East Nuka Subdistrict, which began in late June, did not increase after the liberalized opening was announced, remaining modest but steady for the duration of the season. Aerial surveys continued to monitor escapements, and a survey on July 14 estimated 11,000 sockeyes in fresh water at Delight Lake, all of which were in Delight Lagoon. Because this figure approached the upper end of the SEG for Delight Lake, the markers protecting the mouth of Delight Lake Creek and McCarty Lagoon were repealed beginning July 15, but the weekly fishing period remained five days per week. Not surprisingly, catches spiked after the expanded opening, with a total of around 4,200 fish delivered on July 16.

In a rather peculiar event, the next aerial survey of the Delight Lake system on July 20 showed that a majority of the 11,000 sockeyes observed during the previous survey had mysteriously



disappeared. The missing fish had not ascended to the lake, as the low upstream weir counts confirmed, and commercial seine deliveries did not reflect any catches of this magnitude. Nonetheless, attainment of the escapement goal at Delight Lake suddenly became questionable, so as a result seining near the Delight Lake system was closed beginning July 21, remaining so for the rest of the season. Waters to the north in East Nuka Bay, near Desire Lake, continued to remain open to fishing five days per week. No valid explanation for the disappearance of these fish was ever established.

The peak daily harvest of the season in East Nuka Subdistrict occurred on July 16, immediately following the expansion of waters open to fishing, with a total of 4,200 sockeyes reported. Catches dropped dramatically after that date, and only two more days of deliveries from this subdistrict occurred. The final sockeye landing was made on July 22, bringing the cumulative catch in East Nuka Subdistrict to 11,100 sockeyes for the season (Table 3, Appendix A14).

Low water levels, and subsequent cessation of upstream salmon migration, are typical conditions observed at Delight Lake following extended periods of warm weather and limited precipitation during mid-summer periods. The time of year when this problem usually arises, in mid-July, was instead marked in 2004 by atypical periods of heavy rain and high water, with the latter condition persisting until the adult counting weir near the outlet of the lake was removed at the end of July. Uncharacteristically, the chronic low-water problem occurred later in the season than is normally seen, with water levels and flow rates at Delight Lake reaching the “critically” low stage, i.e. making fish passage impossible, sometime in early/mid August. Although the inlet and outlet streams of Delight Lagoon were completely dry, it was believed that the majority of sockeyes had probably passed upstream into the lake system by this time. Some minor numbers of sockeyes may have been “stranded” along with coho salmon that were observed in the latter part of August, when aerial assessment of the system ceased.

The peak aerial estimate of almost 11,000 fish in fresh water at Desire Lake Creek, made on June 25, was ultimately used as the final index of escapement estimate (Table 3, Appendix A23), while at Delight Lake, a combination of weir counts and aerial observations was used to develop the final index of escapement estimate of 7,300 sockeyes. Both figures fell within the established SEG’s for the respective systems.

A third system of lakes known as Delusion (or Ecstasy or Delectable) Lakes in East Nuka Subdistrict has been monitored over the last fourteen years to document the sockeye salmon return there. Located near the head of the East Arm of Nuka Bay, the two-lake system is relatively new, formed during the late 1970's and early 1980's by a receding glacier. A review of charts and maps drawn prior to the mid-1980's substantiated this fact as no lakes are indicated at the site of the present bodies of water. Prior to the 1980's, no salmon were known to utilize the system, but in approximately 1989, during a routine aerial survey, adult sockeye salmon were documented in the system by the staff for the first time. Each year since then, aerial surveys have revealed sockeye salmon as well as pink salmon in the system. The peak 2004 aerial count of 1,000 sockeyes was recorded during an aerial survey on July 6. Little is known of the origins of this return, although the predominant hypothesis suggests that sockeyes probably strayed from nearby Desire and/or Delight Lake to colonize this new lake system. ADF&G personnel conducted sampling of sockeyes in this system during 1992, 1993, and 1994, with help from University of Alaska students on site. Otoliths and length measurements indicated primarily large 3-ocean fish (six years old). Additional tissue samples were taken from post-spawning

individuals in 1993 and 1994 for inclusion into the genetic baseline data set and future genetic stock identification analysis.

### **Pink Salmon**

Excellent escapements during the 2002 parent year fostered an optimistic pink salmon harvest forecast of over 600,000 fish for the Outer District in 2004, more than three and one-half times the recent 10-year average. The bulk of the harvestable surpluses were expected at Port Dick, although lesser amounts were forecasted at Rocky Bay, Windy Bay, and Nuka Island. However, this forecast failed to account for the unquantifiable effects of the widespread flooding that had occurred throughout the Kenai Peninsula in the fall of 2002, therefore the harvest projections were suspect. The actual harvest of 42,600 pinks (Table 5, Appendix A18) fell far short of the forecast as well as the recent 10- and 20-year averages.

For the third consecutive year, the staff announced prior to the season that certain waters in Port Dick Subdistrict would open on a set calendar date, as opposed to a management strategy predicated upon real-time aerial assessment of returns and escapements in the Outer District. Based on the relatively optimistic forecast, as well as low levels of anticipated effort, waters of the South, Outer, and Taylor Bay Sections of the subdistrict were opened to seining on a schedule of two 40-hour periods per week beginning July 19. This set opening date was intended to encourage effort early in the return, normally dominated by males, and to promote product quality.

Aerial surveys in Port Dick began during the week prior to the opening, and the numbers of pinks observed during the first two surveys suggested that the preseason forecast was overly optimistic. The few seiners that eventually ventured to the area after the opening found “scratch” fishing at best, and little harvest resulted. An aerial survey on July 28, however, documented a strong return of chum salmon to Island Creek, located in the North Section of Port Dick Subdistrict, while a ground survey on June 20 had estimated over 4,300 chums as escapement in Port Dick (head end) Creek. Given this excellent show of chums, waters in the North Section of Port Dick, near Island Creek only, were opened to seining on the same schedule of two 40-hour periods per week as the other open waters in the subdistrict, to target the Island Creek chum return. Waters west of Island Creek in the North Section were kept closed to fishing to protect the smaller chum returns along that shore. Although targeting chums, seiners were unavoidably harvesting pinks in waters of Port Dick, surveys in early August showed that pink returns were significantly weaker than projected. The staff determined that all remaining pinks would likely be necessary to meet escapement requirements, and as a result all waters of Port Dick Subdistrict were closed to seining effective at the end of a regular weekly fishing period August 3. By this time the chum return to Port Dick (head end) Creek was over and that to Island Creek was rapidly declining.

The closure in Port Dick, combined with the weak runs, failed to protect sufficient numbers of pink salmon returning to Port Dick (head end) Creek for escapement purposes, and the SEG for that system was not achieved in 2004. The final escapement estimate of 13,300 pinks fell short of the SEG range of 19,000 – 58,000 fish established for this system (Table 5, Appendix A24). The later run timing of pink salmon returning to Island Creek helped that system slightly exceed its SEG range of 7,200 – 28,300, with an escapement estimated at 33,600 pinks. Interestingly, the seven highest pink salmon escapement totals on record for Island Creek have all occurred after

1995. Seiners ultimately harvested just under 42,000 pinks for the season in Port Dick Subdistrict (Table 5, Appendix A20).

Other pink salmon systems throughout the Outer District generally mimicked the weakness exhibited by those in Port Dick during 2004. Waters of Windy Bay Subdistrict were opened to commercial seining on a conservative schedule of two 40-hour periods per week beginning July 22, after an aerial survey indicated that the relatively good numbers of pink salmon protected by markers might eventually prove the preseason forecast accurate. Unfortunately, this optimism was short-lived, and by early August surveys revealed that little if any surplus was available at Windy Bay. Waters of Windy Bay Subdistrict were therefore closed beginning August 3 to protect fish for escapement. No effort or harvest occurred in Windy Bay during open fishing periods in 2004, thus the entire returns escaped to spawn. At Windy Left Creek, final escapement was estimated at 23,300 pinks, falling within the established SEG, while the figure for Windy Right was 12,000, slightly exceeding the SEG (Table 5, Appendix A24). The final escapement at nearby Rocky River totaled almost 54,000 pinks, near the upper end of the SEG range for that system (Table 5, Appendix A24).

Aerial surveys documented weak pink salmon returns to Nuka Island throughout the season, thus no openings occurred, and final escapement was estimated at 6,400 pinks, within the established SEG of 2,700 to 14,000 (Table 5, Appendix A24). Elsewhere in the Outer District, early aerial observations at Port Chatham suggested that pink returns there appeared insufficient to withstand any effort, thus the subdistrict remained closed to fishing. Postseason analysis of ground survey data indicated an estimated cumulative escapement of 26,000 pinks into Port Chatham systems (Table 5, Appendix A24), slightly exceeding the SEG range. Desire Lake Creek, with an SEG range of 2-20,000 pinks, experienced a pink return strong enough to meet escapement requirements but lacking the volume to provide incentive to fishermen or processors. Despite the fact that waters of East Nuka Subdistrict remained open to seining after the sockeye return to Desire Lake, seiners harvested only minimal numbers of pinks incidentally to the sockeyes in mid/late July. With the last delivery from East Nuka Subdistrict coming on July 22, prior to the peak of the pink return, the resultant harvest of pinks totaled only 1,000 fish (Table 5, Appendix A20). Because of the light effort, the pink salmon SEG for Desire Lake Creek was never in jeopardy, with a final escapement estimate totaling 24,000 pinks (Table 5, Appendix A24).

### **Chum Salmon**

Because chum salmon numbers had experienced dramatic declines in the Outer District since the peak harvest years of the late 1970's and early 1980's, large returns were once again not expected in 2004. However, chum returns to most systems in the Outer District this season were considerably better than any recent year, especially at Port Dick, and for the first time in over a decade commercial fishing was allowed to target chums in that subdistrict. The resulting district-wide harvest of almost 28,000 chums (Table 6, Appendix A21) was the greatest since 1988.

Ground surveys of Port Dick (head end) Creek began in early July, while aerial surveys of other chum systems in the Outer District began coincidentally with early pink salmon assessment in mid-July. These initial evaluations showed very reasonable chum numbers but were not sufficient to consider any commercial openings. By late July, however, escapement into Island Creek at Port Dick, where chum salmon run timing is later than other Outer District chum systems, was approaching the low end of the SEG range of 6,400 to 15,600, while significant chum jumper activity was documented behind protective regulatory markers. As a result, marine waters near Island Creek in Port Dick Subdistrict were opened to commercial seining beginning

July 29 on a conservative schedule of two 40-hour periods per week, the same schedule as other areas in Port Dick that had been opened to target pink salmon returns in mid-July. Waters along the north shore of Port Dick west of Island Creek were kept closed to fishing to protect the smaller chum salmon returns to Middle, Slide, and Port Dick (head end) Creeks.

A small number of seiners were already on the grounds at Port Dick for the pink salmon opening, but the early pink numbers hardly provided incentive to target that species. The chum salmon opening, however, generated considerably more interest, and fishermen immediately began to harvest chums destined for Island Creek. After taking the majority of available chums from marine waters near Island Creek, fishermen began to search for chums in other areas of Port Dick. Unfortunately, pinks were also taken incidentally during these efforts, and an aerial survey on August 2 showed that the pink salmon returns to Port Dick were significantly weaker than originally projected, suggesting that all remaining pinks would likely be necessary in order to achieve escapement objectives. As a result, all waters of Port Dick Subdistrict were closed to further commercial seining beginning August 3, remaining closed for the rest of the season.

The final seine catch in Port Dick Subdistrict totaled 27,700 chums, with about three-fourths of this total taken in the North Section around Island Creek (Table 6). Minor incidental catches in East Nuka Subdistrict brought the overall Outer District chum harvest to 27,900 fish, making it the highest total since 1988 (Appendix A21). Escapements at the four monitored chum salmon systems in the Outer District were achieved or exceeded in 2004. At Koyuktolik (Dogfish) Bay systems, with a combined SEG range of 3,300 to 9,200 chums, the returns were estimated at 3,600 chums (Table 6, Appendix A25). Port Dick (head end) Creek experienced its third highest escapement in the past 25 years, with a total of nearly 8,600 fish, while Rocky River escapement amounted to 17,200 chum salmon, the highest total over the past two decades (Appendix A25). Chum escapement at Island Creek fell near the upper end of the SEG range of 6,400 to 15,600 fish, with a final total of 15,100 fish.

## **Eastern District**

### **Sockeye Salmon**

The Eastern District showed potential for harvestable surpluses of sockeye salmon in Aialik and Resurrection Bay Subdistricts during 2004, with a district-wide preseason projection totaling over 50,000 fish. Actual harvest totaled just 16,600 sockeyes (Table 3, Appendices A13 and A14), far short of the forecast and representing only about 40% of the recent 10-year average. The seine fleet harvested the entire Eastern District sockeye salmon total in the Resurrection Bay Subdistrict (Tables 1 and 3), while no fish were taken for hatchery cost recovery at the Bear Lake enhancement project near Seward.

Sockeye enhancement activities by CIAA at Bear Lake resulted in a projected return ranging up to 52,000 fish assuming optimum survival of various smolt and fry releases. If the forecast proved true, the projected harvestable surplus was about 40,000 fish after accounting for the desired inriver escapement requirements for Bear Lake, established at 5,600 to 13,200 sockeyes in the 2004 Trail Lakes Hatchery Annual Management Plan (AMP).

Based upon the expected long-term increase of sockeyes returning to the Bear Lake system, a Resurrection Bay Management Strategy was developed during the winter of 1991-92. The plan allows the seine fleet to begin fishing on the Bear Lake sockeye run at a relatively early date in the outer reaches of Resurrection Bay in order to promote product quality. In addition, several

modifications to the plan, first implemented by emergency order in 1996, have commonly been utilized since that time. The first change increased fishing time from two 40-hour periods per week to a single five-day period (Monday through Friday). Based on experience during the seasons prior to 1996, this increase would allow greater opportunity to harvest sockeyes without jeopardizing the desired inriver escapement goal for Bear Lake. The second change posted closed waters markers at the mouth of the Resurrection River to better define the river's mouth and the fishing boundaries, which had been problematic prior to 1996. Finally, an area of closed waters along the west side of Resurrection Bay between Caines Head and the city of Seward was implemented in order to protect returning Chinook salmon, which are allocated entirely to the sport fleet and are illegal to retain in the commercial fishery.

The entire Resurrection Bay Subdistrict, up to a point one mile due south of Cape Resurrection and Aialik Cape, was opened to seining by emergency order beginning on Monday, May 17, in keeping with the traditional recent year opening time of mid-May. Prior to 1998, these waters were opened on the second Monday in May, but experience had demonstrated that sockeyes did not begin arriving in Resurrection Bay in appreciable numbers until the end of the month. Despite presumption of an early run timing for this enhanced run (since broodstock utilized for the project had a documented run timing peaking in early June), the first three years of adult returns from 1992 through 1994 actually trickled in over the course of two months. Between 1995 and 2003, with larger numbers of fish returning, the majority of the run appeared in waters at the head of Resurrection Bay during the first two weeks of June.

For the second consecutive season, CIAA established a revenue goal for the Bear Lake sockeye salmon enhancement project. As outlined in the 2004 Trail Lakes Hatchery AMP, CIAA hoped to generate \$63,500 from the sale of sockeyes harvested at their Bear Creek weir site, equating to approximately 13,000 fish using projected figures of \$1.00 per pound and 4.8 pounds per fish. In an effort to provide opportunity for the commercial seine harvest of a portion of the surplus, while still allowing adequate numbers of sockeyes into fresh water for both escapement and cost recovery purposes, the weekly fishing schedule in 2004 was conservatively set at two 40-hour periods per week, as was the case during the previous three seasons. This contrasted with the five-days-per-week schedule employed from 1997 – 2000, when forecasted and actual returns were stronger. CIAA was prepared to harvest fish in the fresh water Special Harvest Area (SHA) at the Bear Creek weir for cost recovery purposes once achievement of the escapement goal was met or could be projected.

When the area first opened in 2004, fishermen were understandably cautious because recent years' returns had not met preseason expectations. As usual, all effort was concentrated at the head end of Resurrection Bay, with the first landing occurring on May 25, over a week after the original opening date. Fish concentrations were meager at the time, and the somewhat late date for the first landing suggested that the return could be weak or was simply late. By the end of that week, the cumulative reported harvest totaled around 1,500 sockeyes, lending credence to the hypothesis of a weak return. Sockeyes began to appear at the Bear Creek weir on May 28, but numbers were small.

Both effort and harvest increased as expected the next week, the first week of June, since the commercial harvest traditionally peaks towards the end of that time. Although larger, catches that week were rather disappointing, cumulatively totaling about 9,200 sockeyes taken by 6 – 8 vessels for the week. With the total seine harvest of less than 11,000 sockeyes landed by the end of that first week in June, and an escapement of around 600 sockeyes past the weir, a significant influx of fish would be required in order to attain the preseason forecast. Unfortunately, catches during the

following week decreased from the previous week, totaling only about 5,300 sockeyes, bringing the cumulative harvest for the season to approximately 16,000 fish. Despite the weekly seine fishing schedule designed to allow for adequate escapement during mid-week and weekend closures, fewer than 2,000 sockeyes had been documented past the Bear Creek enumeration weir through June 11.

In one last effort to determine whether the sockeye return to Bear Lake would materialize later than expected, the seine fishery was allowed to reopen for a regular weekly period on June 14. However, the paltry catches reported that day effectively sealed the fate of the fishery. Since an escapement near the upper end of the desired inriver range of 5,600 to 13,200 was sought, the staff reasoned that the remainder of the return would likely be necessary to achieve this objective. Therefore, the commercial seine fishery in Resurrection Bay was closed at the end of the fishing period on June 15 for the remainder of the season. Total harvest for the fleet in Resurrection Bay Subdistrict was about 16,600 sockeyes (Table 3).

The closure indeed allowed all remaining sockeyes to enter fresh water, but the return ultimately proved substantially weaker than the preseason forecast. Escapement progressed slowly but steadily after the closure, peaking between June 23 and 27 with the passage of an average of almost 1,000 sockeyes through the weir per day during that time frame. Passage rates through the weir dropped steadily after this time but were still sufficient to allow achievement of the upper end of the desired escapement range into the lake. Unfortunately, no excess fish escaped the commercial fishery, therefore no cost recovery was conducted by CIAA. The final cumulative escapement past the weir totaled about 11,900 sockeyes (Table 3, Appendix A23). The total Bear Lake sockeye return (catch plus escapement) was estimated at 28,600 fish, representing only about 55% of the expected return.

A second sockeye enhancement project was initiated at nearby Grouse Lake in 1994, when over 200,000 juvenile fish were planted in this Resurrection Bay system. As outlined in past years Trail Lakes Basic and Annual Management Plans, the entire sockeye return to Grouse Lake was allocated specifically to CIAA for the express purpose of hatchery cost recovery. Grouse Lake was subsequently stocked for three additional years (no fry were stocked in 1996), but adult returns failed to meet expectations for unknown reasons, and CIAA suspended the enhancement of Grouse Lake after the 1998 season. No sockeyes were expected to return to Grouse Lake in 2004, therefore no provisions to facilitate hatchery cost recovery harvest of Grouse Lake sockeyes were enacted.

At Aialik Lake in Aialik Subdistrict, aerial surveys were initiated on June 21, but no fish were documented until the next survey on June 25 when 700 sockeyes were noted in fresh water. Over the next week and one-half, escapement estimates had only risen to about 3,100 sockeyes in fresh water on July 6. Since this figure was short of the SEG (3,700 – 8,000), the staff decided that no opening to target this stock was warranted, and waters of Aialik Subdistrict remained closed for the season. Two more aerial surveys of the system were flown, with the last of the season in early August indicating that a late surge of fish apparently escaped into the system, bringing the final escapement index to 10,100 sockeyes for Aialik Lake (Table 3, Appendix A23).

### **Pink Salmon**

A harvestable surplus of only 13,000 pinks was forecasted in Eastern District waters for 2004, on par with the primarily weak returns in most recent years. Because of the expensive nature to adequately assess the small streams there, and also because no directed openings were expected, surveys of Resurrection Bay systems were limited to on-grounds estimates in mid/late August. Results and final estimates suggested that returns were as weak as expected. At Bear and Salmon

Creeks, where the combined pink SEG is 4,900 to 21,700 fish, a total of 1,200 pinks were estimated (Table 5, Appendix A24), the lowest total since 1988. The figure for Thumb Cove, with an SEG of 2,400 to 8,900, was estimated at 4,300 pinks, while at Humpy Cove (900 to 3,200 SEG) about 1,000 fish were estimated. Tonsina Creek produced an estimate of 3,500 pinks, falling within the SEG range of 500 to 5,900 pinks. Due to the trend of primarily weak but highly variable returns during recent years, no openings for pinks were allowed in Resurrection Bay this season and therefore no harvest occurred. In Aialik Bay, no pink salmon openings were allowed and no harvest resulted.

### **Other Species**

Chum salmon have occasionally been an important component of commercial catches in the Eastern District, but catches during the past 10 years have averaged only about 600 fish annually. This season's chum harvest amounted to only a single fish (Table 6, Appendix A21), taken incidentally during the Resurrection Bay directed sockeye fishery in June. Due to a pattern of weak Eastern District returns over the past 10-15 years, no directed openings for chum salmon were allowed in the Eastern District this season. Approximately 1,400 chums were estimated as escapement into Tonsina Creek in Resurrection Bay (Table 6), continuing the trend of weak returns to this system.

Coho salmon are not normally a commercially important species in the Eastern District but are an integral component of an enhancement project, originating from Bear Lake, which benefits sport fishermen in area waters. Because the Resurrection Bay Salmon Management Plan specifically directs the Department to manage coho stocks there for recreational use only, coho salmon may not be retained in the commercial fishery. However, all sport-caught coho salmon entered into the Seward Silver Salmon Derby are subsequently sold by the city of Seward, organizer of this sport fishing derby, to a commercial processor. Therefore, these catches are considered "commercial harvests" and are listed in the commercial catch tables to document this fact. In 2004, a total of 4,400 cohos were entered into the Seward Silver Salmon Derby (Tables 1 and 4). In addition, a portion of the returning adults from the enhancement project are traditionally harvested at the Bear Creek weir by CIAA as cost recovery for expenses incurred. During years when the salmon market was strong, CIAA customarily sold most cost recovery cohos to a commercial processor(s). Because market forces now make product quality a central issue, many of the cohos taken at the weir are unmarketable due to excessive fresh water marking. As has become commonplace in recent seasons, all cohos caught at the Bear Creek weir this year were donated to various individuals, many of whom were dog mushers. Total hatchery harvest from the Bear Creek weir was approximately 1,200 cohos (Tables 1 and 4), comprising about 10% of the entire LCI coho catch this season. Just under 900 cohos were collected for hatchery broodstock, while an additional 600 fish were allowed into Bear Lake as escapement (Table 4). Total commercial catch in the entire Eastern District amounted to about 5,600 cohos (Table 4, Appendix A17), about 87% of the recent 10-year average of 6,500.

## **2004 SALMON ENHANCEMENT AND REHABILITATION**

### **INTRODUCTION**

Fisheries enhancement has played a major role in LCI salmon production for over two decades. Natural adult salmon returns to the LCI area continue to demonstrate wide fluctuations, often the result of environmental impacts such as streambed scour, de-watering, or redd freeze-out on spawning grounds, all of which potentially lower overall survival rates. Since their inception in the mid-1970's, enhancement and rehabilitation projects have made significant contributions to both

commercial and sport fishing harvests. These contributions have historically ranged from 24% to 90% of the entire LCI commercial salmon harvest and are expected to remain high in future years.

Projects initiated by the ADF&G and presently being undertaken by CIAA provided an estimated 43% (1.24 million salmon) of the total 2004 LCI commercial harvest of 2.87 million fish. PGHC-produced fish contributed approximately 45%, or 1.28 million fish, to LCI salmon harvests, while CRRC-managed projects produced a commercially harvested total of about 2,500 fish in 2004. The Leisure/Hazel, Kirschner and Bear Lakes sockeye salmon enhancement projects produced approximately 52% (67,600 fish) of the total LCI sockeye harvest of 130,000 fish in 2004, down from the 76% contribution last year and far from the record high of 84% contributions in both 1995 and 1999. Tutka Lagoon Hatchery production accounted for approximately 47% (1.18 million fish) of the 2004 LCI commercial pink salmon harvest of 2.52 million fish, while Port Graham Hatchery accounted for about 51% (1.28 million fish).

Using average weights per fish and average prices per pound in LCI, the estimated contribution of CIAA, PGHC, and CRRC-produced salmon was 52% (\$0.657 million) of the \$1.27 million total value of the 2004 LCI commercial salmon harvest. About 32% (\$0.4 million) of the total exvessel value of the fishery was utilized for hatchery cost recovery purposes (Table 7). A brief description of the current enhancement projects in LCI follows.

### **TUTKA LAGOON HATCHERY**

The Tutka Lagoon Salmon Hatchery/Rearing Facility was constructed in 1976 with an initial production capacity of 10 million salmon eggs, but expansion over time, including major renovation work during the winter of 1993-94, increased its capacity to the present level of approximately 150 million eggs. Pink salmon have been the primary species produced at the hatchery, while secondary chum enhancement was discontinued in favor of more recent efforts directed toward sockeye salmon. Although the hatchery now has a sockeye egg capacity of 1.8 million eggs, and raceways to accommodate the resulting fry, efforts to incubate and rear sockeye to the smolt stage have been plagued by the IHN virus, resulting in an indefinite termination of the sockeye program. In 2004 the CIAA announced suspension of Tutka Hatchery operations, essentially ending the annual full-scale pink salmon incubation and release program. The last adult pink salmon return to the facility will occur in 2005, the result of brood collection in 2003 and subsequent fry release in 2004.

In 2004, the overall return of adult pink salmon produced by Tutka Lagoon Hatchery totaled approximately 1.196 million fish (Table 9). No attempt was made to identify the contribution resulting from natural spawning in Tutka Creek. The estimated 1.8% overall survival rate this season is the highest since 1999 but lower than the long-term estimated average survival of around 2.0%. The commercial harvest, including cost recovery, of 1.177 million pink salmon from Tutka Bay and Lagoon (Table 9) accounted for approximately 48% of the pink salmon landed in the Southern District and 47% of the entire LCI commercial pink salmon harvest. Pinks taken for hatchery cost recovery purposes from the Tutka Bay Subdistrict totaled 1.175 million fish, worth approximately \$75,000, falling far short of the \$1.18 million sales revenue goal for 2004. Approximately 48.0 million short-term reared pink salmon fry were released from Tutka Hatchery in 2004 (Appendix A34), the lowest total since the 1993 release of 43.0 million fry. Over 95% of these fry were released just outside of Tutka Lagoon in Tutka Bay proper, with the remainder released inside Tutka Lagoon. As mentioned earlier, because of the indefinite suspension of Tutka Hatchery operations, no broodstock were collected in 2004, and 2005 marks the final adult pink salmon return resulting from hatchery releases.



## **LEISURE AND HAZEL LAKES SOCKEYE SALMON STOCKING**

Leisure (China Poot) Lake, located on the south side of Kachemak Bay across from the Homer Spit, historically was a system barren of sockeye salmon. A study initiated in 1976 involved the evaluation of stocking of hatchery-produced sockeye salmon fry to determine optimum stocking levels prior to and after lake enrichment through fertilization. Because a barrier falls below the lake prevents upstream migration and precludes any adult spawning, it is desirable to harvest all returning adult fish in the terminal harvest area, China Poot Bay. Beginning in 1988, a similar sockeye stocking program was initiated at Hazel Lake, which empties into Neptune Bay and is located approximately three miles south of Leisure Lake. Since the inception of these projects, over 2.76 million adult sockeyes were estimated to have returned as a result of these stocking programs (Appendix A15), making significant contributions to the commercial and recreational sockeye harvests in the Southern District.

Because of the close proximity of the two terminal harvest areas, and the absence of a mark/recovery program, adult returns to Leisure and Hazel Lakes cannot be separately identified through sampling within the commercial catches and are therefore presented as a combined total. The cumulative total sockeye return to Leisure and Hazel Lakes in 2004 was estimated at only 40,600 fish (Figure 11, Appendix A15), a record low since those two returns have been tallied together beginning in 1991. The cumulative estimated commercial harvest of 34,600 fish comprised approximately 68% of the Southern District sockeye harvest and just over one-fourth of the total LCI sockeye salmon harvest. The Southern District sockeye harvest of 50,700 fish was the lowest since 1986.

Leisure Lake was stocked with 2.0 million sockeye fry in 2004, while Hazel Lake was stocked with 0.35 million fry, both figures down from the respective previous 10-year average stocking rates for these two systems (Appendix A34).

## **ENGLISH BAY SOCKEYE SALMON REHABILITATION**

The English Bay Lakes system has the only significant stock of sockeye salmon native to the Southern District of LCI. Unfortunately, English Bay sockeye returns declined to their lowest recorded levels in the last half of the 1980's decade. Sockeye escapement estimates between 1985 and 1993 ranged from 2,500 to 8,900 fish; all but one of these years (1993) was well below the 20-year average of 7,800 fish (Appendix A23). The decline of the English Bay sockeye run resulted in a very restrictive management strategy for this area. The commercial, sport, and subsistence fisheries were closed during the sockeye run for most years mentioned. Efforts to rehabilitate this depressed stock were initiated by ADF&G with an egg take in 1989 and the subsequent release of 350,000 sockeye salmon fry in 1990 (Appendix A34). Chugach Regional Resources Commission (CRRC), in cooperation with the village of Nanwalek (formerly English Bay) and the Bureau of Indian Affairs (BIA), has since taken over this enhancement project, now known as the Nanwalek Salmon Enhancement Project (NSEP). NSEP has continued broodstock and egg collections/incubation, fry rearing, fry stocking, and operation of a smolt/adult enumeration weir.

Whereas the escapement figures for English Bay Lakes prior to 1994 were index estimates based on aerial surveys, escapements beginning with the 1994 season have been monitored through the use of a counting weir, operated by CRRC/NSEP. The cumulative total that first year numbered 13,800 sockeyes (Appendix A23), the highest return since 1982 and the first year since 1984 in which the minimum desired goal of 10,000 fish was achieved. In 1995 and 1996, the weir totals were 22,500 and 12,400, respectively, with the former representing the highest figure over the past 20 years.

In the early 1990s, optimum escapement for this system was estimated to be less than the original maximum goal of 20,000 sockeyes (Edmundson et al. 1992). A plan to tightly control spawning escapement into the lake by harvesting those fish surplus to the maximum desired goal of 15,000 was adopted by ADF&G staff, representatives of CRRC/NSEP, and village residents from Nanwalek during meetings held over the winter of 1995-96. This escapement goal remained in place during the years 1996 – 2001. After the 2001 season, the Department conducted an escapement goal review for all salmon systems in the LCI management area and presented the results to the Alaska Board of Fisheries (BOF) at its Anchorage meeting in November 2001. The BOF approved the new sustainable escapement goals (SEG's) proposed by the Department, and the new goals were implemented for the first time in 2002. Based on the Department's analysis, the new SEG for English Bay Lakes was expressed as a range of 6,000 to 13,500 sockeyes. When the sockeye enhancement project's annual broodstock requirements, which are removed from the escapement into the lakes, were added onto the SEG, the desired inriver return became a range of 9,400–16,900 sockeyes (mid-point 13,150) for the 2004 season.

The Port Graham Subdistrict, including both Port Graham and English Bay Sections, was not allowed to open to commercial set gillnet fishing in early June this season because of a relatively low preseason forecast of only 18,000 fish, three-fourths of which would be needed to satisfy the midrange escapement goal of 13,000 fish into the English Bay lake system. The subsistence fishing season, which opened on April 1, was allowed to remain open for the duration of the sockeye return so residents could take advantage of the small projected surplus to fill their subsistence needs. The poor adult return forecast this year was due to lower smolt emigration numbers in 2001 (175,000 smolts, down from 750,000 in 2000) and 2002 (only 24,500 smolts). Because escapement counts had nearly reached the mid-point of the inriver goal by the first of July, the commercial set gillnet fishery was subsequently opened beginning July 3. Final estimated escapement into English Bay Lakes for the season tallied 16,700 fish (Table 3, Appendix A23), while commercial set gillnetters in the Port Graham Subdistrict harvested about 2,500 sockeyes (Table 3). Because of the low preseason forecast, no hatchery revenue goal was established this season, and as a result no cost recovery fishing occurred. The subsistence harvest by villagers from Port Graham totaled almost 600 sockeyes (Appendix A31), while that for Nanwalek was nearly 3,000 fish. The cumulative subsistence catch of 3,500 sockeyes for both villages was less than the 5,200 fish taken in 2003, while figures for both seasons were lower than the record high catch of 10,600 sockeyes in 2002 (Appendices A31 and A32). The cumulative total return of sockeyes to English Bay Lakes in 2004 was estimated at nearly 23,000 fish.

The CRRC/NSEP enumeration weir was installed and became operational on June 4, with a passage the next day of ten fish; NSEP staff estimated that 300 fish had passed upstream before installation of the weir. Daily passage rates increased steadily over the next week and one-half, with a count of nearly 700 fish recorded on June 16. However, the next day high water forced the removal of the weir for four days until June 20, when water levels allowed re-installation of the weir. An estimated 1,640 fish passed upstream during the four-day period when the weir was not operational. The peak daily count for the season occurred during a three-day period one week later when an average of nearly 1,200 sockeyes per day was documented. The final cumulative escapement for the season was 16,700 sockeyes (Table 3, Appendix A23), falling near the upper end of the desired inriver goal range.

Port Graham Hatchery was granted a Permit Alteration Request (PAR) to rear fry resulting from the 2003 English Bay Lakes egg take to the presmolt stage for release back into the lake system

in 2004. As a result, an estimated 50,000 fry were released directly into English Bay “Second” Lake during mid-August (Appendix A34), while an additional 109,000 fry originating from English Bay Lakes’ broodstock remained at the Port Graham Hatchery for a separate project, ultimately slated for saltwater release into Port Graham Bay. Broodstock collection efforts in Second Lake resulted in the capture of 1,390 adults and a subsequent egg take of 1.77 million eggs. Under contract to CIAA, the eggs were flown to Homer then transported by truck to Trail Lakes Hatchery near Seward for incubation.

Viral and disease outbreaks in the lake rearing of juveniles since the project’s inception, as well as unexpected adult behavior that resulted in the failure to collect any broodstock in 2001 and difficulty in collecting broodstock in 2003, have caused concerns regarding the English Bay Lakes sockeye program. Additionally, because the long-term rearing of juvenile sockeyes in waters containing actively spawning adult sockeyes violates state fish culture and disease policy, ADF&G prohibited this practice in English Bay Lakes after the 2003 season. At this time, it is unclear whether sockeye eggs from English Bay Lakes will continue to be collected and, if so, where those eggs and resulting fry will be incubated and reared.

## **BEAR LAKE SOCKEYE SALMON ENHANCEMENT**

Bear Lake, located at the head of Resurrection Bay in the Eastern District, has been the target of sockeye salmon enhancement efforts for over a decade. Since 1962, this system has also been the centerpiece of a Sport Fish Division coho salmon enhancement program, part of which included limiting the escapement of sockeye salmon into the lake. As a result, only a small remnant run of naturally spawning sockeye salmon remained at Bear Lake. In an effort to produce increasing numbers of adult sockeyes without adversely affecting coho salmon production, as mandated by Board of Fisheries policy, CIAA undertook a sockeye stocking program beginning in 1989 with the release of 2.2 million sockeye fingerlings. Since then, additional releases of fry, fingerlings, and accelerated growth (“zero check”) smolts have occurred, ranging from 0.2 to 2.4 million juvenile sockeye salmon each year (Appendix A34).

The first year of enhanced adult sockeye returns in 1992 was discouraging, with a total of less than 2,000 fish, but returns increased during each of the following three seasons. The return in 1996 was almost identical to that of 1995, totaling nearly 53,000 sockeyes, the highest to date. Since 1996, returns have not met the system’s hypothesized potential.

The harvestable surplus of sockeye salmon bound for Bear Lake was forecasted at 40,000 fish in 2004. A conservative commercial seine fishing schedule was implemented in waters of Resurrection Bay for the fourth consecutive season, and for the second successive season, CIAA established a revenue goal for the Bear Lake project. Commercial seine fishing time was limited to two 40-hour periods per week (from 6:00 a.m. Monday until Tuesday at 10:00 p.m. and from 6:00 a.m. Thursday until 10:00 p.m. on Friday), beginning May 17.

Commercial harvests as well as escapement trends were monitored closely, with the first seine catches reported on May 25 and the first fish arriving at the weir on May 28. Despite the conservative fishing schedule, only 2,300 fish had been tallied past the weir through June 13, while cumulative seine catches totaled around 16,000 fish. These catch and escapement figures clearly indicated that the sockeye return to Bear Lake was significantly weaker than the 40,000 fish preseason forecast, making achievement of the desired inriver escapement goal of 5,600 to 13,200 fish questionable. Additionally, no fish had been harvested for hatchery cost recovery since all fish escaping commercial nets were allowed into Bear Lake for escapement. Therefore,

in an effort to increase the escapement rate into Bear Lake, and allow opportunity to attain the hatchery revenue goal of \$63,500, commercial salmon seining was closed effective 10:00 p.m. Tuesday June 15, for the rest of the season. Despite the closure, daily escapement rates remained slow, with a peak daily passage of nearly 1,200 fish occurring on June 26, but the final cumulative escapement of 11,900 sockeyes (Table 3, Appendix A23) did fall near the upper end of the desired inriver range. The common property purse seine fishery ended the season with a harvest of 16,600 sockeyes (Tables 1 and 3). All fish escaping the fishery were needed to satisfy escapement and broodstock objectives, and no cost recovery harvests occurred at the Bear Creek weir. The 2004 Bear Lake total return (escapement, broodstock and commercial catch) equaled 28,600 sockeyes, a slight increase over last year's return of 23,600 fish.

A cumulative total of approximately 3.0 million sockeye fry and pre-smolts were released into Bear Lake during 2004 (Appendix A34), while 5.7 million sockeye eggs were collected for incubation over the 2004-2005 winter at Trail Lakes Hatchery in Moose Pass. Increased stocking levels in Bear Lake over the past three seasons are expected to increase adult returns commensurately beginning in 2005 and 2006.

### **GROUSE LAKE SOCKEYE SALMON STOCKING**

A second sockeye enhancement project in Resurrection Bay of the Eastern District was initiated at Grouse Lake in 1994. From the project's inception, all returning Grouse Lake sockeyes were specifically designated for hatchery cost recovery in accordance with the Trail Lakes Hatchery Basic Management Plan, therefore a directed common property seine fishery was never allowed on this return. Broodstock for this project was originally collected from Packers Lake on Kalgin Island in Upper Cook Inlet (UCI), but in subsequent years broodstock was also taken from Tustumena Lake in UCI. These two stocks were selected specifically for their late run timing characteristics so as not to overlap with the earlier Bear Lake sockeye return.

The first adult salmon from the initial 1994 release returned in 1996. Smolt releases continued annually through 1998, except in 1996 when the IHN virus was detected during Trail Lakes Hatchery operations and all fish were destroyed. The number of smolts released into Grouse Lake ranged from 0.6 million in 1994 to 1.9 million in 1997 (Appendix A34), but sockeye stocking at Grouse Lake was discontinued after 1998. Because of inconsistent adult returns to Grouse Lake, ranging from an estimated 800 fish in 1996 to 100,000 in 1999, and also because of issues regarding product quality, CIAA ceased sockeye enhancement at Grouse Lake and instead began to increase early-run sockeye production at nearby Bear Lake. Due to the discontinuation of stocking after 1998, no adult return forecast was generated for Grouse Lake in 2004, and no attempt was made to harvest or enumerate the few adults that may have returned to the system this year. In the future, sockeye adults resulting from natural spawning may continue to return to Grouse Lake, but numbers are expected to be minimal.

### **CHENIK LAKE SOCKEYE SALMON ENHANCEMENT**

Chenik Lake, located in Kamishak Bay on the west side of LCI, historically was an excellent sockeye producer prior to the 1940s, when annual runs approached 150,000 fish. After that time, however, sockeye runs declined dramatically, forcing a complete closure of the Chenik area fishery beginning in 1952. By the mid-1970s the average annual return to this system was less than 500 fish.

In 1978 ADF&G initiated a program to re-establish the Chenik sockeye run and subsequently increase commercial fishing opportunities in the Kamishak Bay area. Sockeye fry, collected from Tustamena Lake broodstock and incubated at the now closed Crooked Creek Hatchery, were annually stocked in Chenik Lake from 1986 through 1996 (except for one year, Appendix A34), and a partial migrational barrier at the intertidal mouth of Chenik Creek was modified to allow easier fish passage. Beginning in 1987, and from 1989-1991, lake enrichment occurred through the experimental application of liquid fertilizer. Increased sockeye escapements in the early 1980's augmented production, and the Chenik area was reopened to commercial fishing. Subsequent adult returns accounted for up to 50% of the total LCI commercial sockeye harvest in some years, approaching the historical record high runs of the 1930's. Beginning in 1989, sockeye returns to Chenik Lake inexplicably began to steadily decline.

Between 1991 and 1996, the outmigration of sockeye smolts at Chenik Lake was monitored with a weir and live trap. Infectious Hematopoietic Necrosis Virus (IHNV), a disease commonly affecting both juvenile salmon and trout, was documented in the Chenik system during the 1991-1993 smolt outmigrations and is suspected of causing increased mortality to juvenile sockeyes. The lingering effects of IHNV are believed to be the main cause for reduced adult returns to the system in subsequent years. A thorough investigation of the relationship between the Chenik Lake sockeye stocking project and the IHNV problem was initiated during the winter of 1992-93, ultimately resulting in a staff recommendation to reduce fry stocking densities from peak levels occurring in 1989 and 1990.

Factors relating to IHNV epizootics are very complex and currently not well understood. Although remotely possible that stocked sockeye salmon fry were the source of the virus, a more likely cause is that Chenik Lake became a reservoir for IHNV released from the sex products of naturally spawning adult sockeyes and/or their decomposing carcasses. It was hypothesized that the tremendous population declines experienced by the sockeye stock at Chenik Lake in the late 1930s and 1940s may have resulted from IHNV epizootics caused by record high escapements of up to 53,000 adults in the 1930s.

Unfortunately, there is no known practical onsite treatment of IHNV other than perhaps decreasing fry stocking densities, which was begun in 1993 with a reduction to just over one million sockeye fry (Appendix A34). This experiment was inadvertently stretched to its maximum limit by default in 1994 when no hatchery-produced fish were released into the system. The fry from Crooked Creek Hatchery, which were slated for stocking at Chenik Lake that year, were destroyed due to an outbreak of the IHN virus at the hatchery facility. It should be noted that this was the first documented incidence of IHNV at the Crooked Creek facility in its 23 years of operation. Stocking resumed in 1995 with the release of 1.13 million sockeye fry into Chenik Lake, while just under 1.0 million fry were stocked in 1996, the last year stocking occurred (Appendix A34).

It was thought that reduced adult escapement would also help to decrease transmission of IHNV into the littoral zone of Chenik Lake. Because of the small returns of sockeyes to Chenik Lake over the past decade, and in an effort to protect the few returning fish for escapement, no directed commercial fishing effort was allowed on this stock between 1994 and 2003. This year aerial surveys conducted in late June produced an estimate of 2,500 sockeyes in salt water behind and protected by closed water markers, suggesting a very strong return. With an SEG of 1,880 to 9,300 sockeyes in place for Chenik Lake, the encouraging survey results three weeks prior to the traditional peak of the return, coupled with a return in 2003 that was nearly five times that of the previous 5-year average, convinced the staff to open the commercial fishery five days per week

beginning June 28. Initial sockeye catches were encouraging, cumulatively totaling nearly 23,000 fish by July 4. However, fish were inexplicably reluctant to move into fresh water during early July, and an upcoming low tide series threatened to force fish outside the protective markers, leaving them vulnerable to harvest. Therefore, the fishery was closed effective July 5 to protect the fish for escapement. A subsequent aerial survey on July 12, under less than ideal conditions, revealed that an estimated 2,500 fish had entered freshwater, achieving the lower end of the SEG range. For that reason, the Chenik Subdistrict was reopened to fishing five days per week effective July 13. On July 20, after a survey revealed that the freshwater escapement had exceeded the upper end of the SEG, the regulatory markers protecting waters near the mouth of Chenik Lake Creek were repealed, and fishing was allowed inside waters of Chenik Lagoon seven days per week for the remainder of the season.

The final index of escapement into Chenik Lake, estimated at 17,000 fish sockeyes (Appendices A16 and A23), was the highest figure since 1990. The commercial catch in waters of Chenik Subdistrict totaled over 33,000 fish (Table 3), the greatest since 1991, bringing the cumulative total Chenik Lake return to 50,200, also the highest since 1991 (Appendix A16). The reasons for the significantly higher returns to Chenik Lake over the past two seasons are difficult to assess, particularly with a lack of juvenile information. The increased 2003 return may have simply been a reflection of strong area-wide sockeye returns experienced at other LCI systems (i.e., Leisure/Hazel and Kirschner Lakes) rather than to previous efforts at reducing fry rearing densities. In sharp contrast, while the Chenik Lake return experienced a recent-year record this season, the poor sockeye returns to Leisure/Hazel and Kirschner Lakes in 2004 can perhaps be explained by the low stocking levels in 2001. Nonetheless, the discontinuation of annual supplemental stocking at Chenik Lake equated to a reduction in fry loading, which in turn would theoretically reduce the potential for IHNV epizootics, thus increasing smolt production and subsequent adult returns. Furthermore, the resident lake trout population in Chenik Lake, previously thought to have benefited from the regular stocking of sockeye fry and thus further contributing to the suppression of juvenile sockeye levels, may have had less impact in recent years.

The aforementioned schemes of reduced adult escapements and decreased stocking levels appeared to successfully reduce the incidence of IHNV in the system as evidenced by the healthy smolt leaving the lake from 1994 – 1996. Unfortunately, the numbers of outmigrating smolts during that time were miniscule relative to the stocking levels, and measures taken in the mid-1990's failed to achieve the expected increase in production at Chenik Lake. As a result, CIAA could no longer justify the expense of stocking Chenik Lake, discontinuing the project after the 1996 season. Given the encouraging strength of the sockeye returns during the past two seasons, both of which resulted entirely from natural production, the Department is not considering any further enhancement or fertilization activities for Chenik Lake in the near future.

## **OTHER SOCKEYE SALMON LAKE STOCKING**

Kirschner Lake in the Kamishak Bay District was stocked with sockeye fry for the first time in 1987 (Appendix A34), and 2004 marked the sixteenth year that adult sockeyes have returned to this site. This year the entire catch of 16,400 fish (Table 3) was harvested and sold to recoup hatchery operating expenses, and no directed commercial effort was allowed. The 2004 return, estimated at around 17,000 sockeyes including unharvested fish, exceeded the preseason forecast of 12,000 fish but was lower than the return of 50,400 fish estimated last year. The Kirschner Lake system has remained one of the steadiest producers of LCI stocked lakes since the

inception of the program at that site. Approximately 251,000 fry were stocked into Kirschner Lake in 2004 (Appendix A34).

No sockeye salmon were expected to return to four other Kamishak Bay lake systems (Bruin, Ursus, Upper Paint, and Lower Paint) in 2004. All of these systems were evaluated through pre-stocking studies conducted between 1986 and 1989 and were regularly stocked with sockeye fry between 1988 and 1996 (Appendix A34). After that time, all stocking at these sites was suspended. However, CIAA was allowed to experimentally stock Upper Paint Lake with 536,000 sockeye “pre-smolts” in early October of 2002. An amendment to the 2002 Trails Lake Annual Management Plan granted the aquaculture association authorization to stock juveniles that were surplus to the 2002 AMP stocking schedule, a result of unexpectedly high survival rates during the incubation phase at Trails Lake Hatchery. This was the first time the Paint River Lakes system has ever been stocked in the fall with fry that were reared to the pre-smolt stage; all previous releases were of traditional spring/early summer fry releases. Permit conditions for this experimental stocking required that CIAA conduct smolt outmigration studies in the spring of 2003, which resulted in a smolt count of only 7,000 fish, suggesting that over-winter survival was poor. Furthermore, follow-up hydroacoustic surveys in October 2003 revealed that no fingerlings were over-wintering in the lake system, refuting the hypothesis that the stocked juveniles may have held over in the lake for an additional year. The first adult sockeyes resulting from the pre-smolt release are expected to return to Paint River in 2005 as age-1.2 fish, but the 2003 assessment work, as well as historical success rates for the Paint River stocking program, imply that adult returns from the experimental stocking will be minimal.

#### **HALIBUT COVE LAGOON AND SELDOVIA BAY CHINOOK SALMON ENHANCEMENT**

Chinook salmon enhancement projects at Halibut Cove Lagoon and Seldovia Bay involve the release of Chinook salmon smolts, with the objective of increasing sport fishing opportunities in Kachemak Bay. The program at Halibut Cove Lagoon is the oldest and one of the most popular sport fishing enhancement projects in LCI, operating continually with an annual release of smolts since 1979. Although adult returns from the two stocking programs are not intended for commercial harvest, there is incidental harvest of these Chinook salmon in the commercial set gillnet and seine fisheries. The long-term estimated incidental harvest of enhanced Chinook salmon by commercial fishermen in Halibut Cove Subdistrict has been approximately 30% of the total return. No such estimates are available for the commercial fishery in Seldovia Bay Subdistrict. Percentage figures for the incidental Chinook harvest during 2004 were not generated but were thought to be near the historical average. The commercial harvest of Chinook salmon in Halibut Cove and Seldovia Bay Subdistricts this season totaled approximately 900 and 250 fish, respectively, while 300 Chinook were caught in Tutka Bay Subdistrict (Table 2). Historical releases of juvenile Chinook salmon at these two project sites are found in Appendix A34.

#### **PORT GRAHAM HATCHERY**

In an effort to supplement natural fish production and provide increased employment opportunities in the native village of Port Graham, the Port Graham Hatchery Corporation (PGHC) applied for and received a permit to operate a private non-profit (PNP) hatchery in 1992. Port Graham is located approximately 21 nautical miles southwest of Homer on the south side of Kachemak Bay (Figure 2). The hatchery had conducted experimental pink salmon egg-takes and fry releases via a scientific/educational permit from 1990 through 1992, while these activities were subsequently permitted in the Port Graham Hatchery Basic and Annual Management Plans (BMP/AMP).

Original startup broodstock was collected from a natural run of pinks in the Port Graham River, at the head of Port Graham, and the PNP permit for PGHC allows for continued pink salmon broodstock collection from this source. However, the Port Graham River pink run has historically experienced significant natural fluctuations in escapements despite conservative fishing schedules, causing some concern for protection of the natural stocks. Consistent with the priority of managing for natural stocks (**AS 16.05.730**), a broodstock collection schedule based on the sustainable escapement goal for Port Graham River, as well as historical escapement levels, was developed to offer maximum protection to the wild pink salmon stock during years of weak returns.

Harvest of both natural and hatchery stocks could potentially occur in commercial purse seine and set gillnet fisheries, as well as a subsistence set gillnet fishery, in Port Graham since the returning hatchery fish would undoubtedly intermix with wild stocks bound for the Port Graham River. Management decisions attempt to address the effects of these various fisheries to protect natural stocks until adequate escapement into Port Graham River can be confirmed. A small natural return of chum salmon to Port Graham River also occurs, and since this run has been depressed in recent years, management measures also strive to protect this species as well.

The approved Port Graham Hatchery BMP designated a salt water Special Harvest Area (SHA) to allow for broodstock collection and cost recovery harvest (Figure 6). The SHA was designed to provide a migration corridor on the northeast side of the bay for wild stocks traveling to Port Graham River at the head of the bay, thus affording some limited protection to the natural spawning stocks of pink and chum salmon.

Initial adult pink salmon returns to the hatchery in both 1992 and 1993 failed to appear despite predictions of at least moderate returns. Because no fry were released in 1993, both the forecast and actual return for 1994 were zero. The 1995 pink return to Port Graham Hatchery was forecasted at 20,000 to 50,000 fish, with the actual return totaling an estimated 20,000 pinks, while only 2,700 fish returned in 1996, when the preseason forecast called for 7,000 to 10,000 returning pinks. In 1997, returns finally fell within the preseason forecast range of 80,000 to 200,000 pinks, with a total run size estimated at about 130,000 fish. Despite a forecast of 30,000 to 50,000 fish in 1998, the return totaled less than 13,000 pinks. Because of a fire in January 1998 that destroyed all of the hatchery pinks and sockeyes in incubation at the time, no pink salmon returned to the hatchery in 1999. In 2000, all returning pink salmon (38,500 fish) were taken for broodstock, as was the case in 2001 when 19,000 fish were tallied. Despite an optimistic forecast calling for a return of 864,000 pinks in 2002, only about 335,000 fish returned as a result of a 2001 release of 27.3 million fry. Just over 70% of that year's return was harvested for cost recovery, with the remainder used to fulfill broodstock requirements. Despite failing to achieve the projection, the 2002 pink return to Port Graham Hatchery represented a record high for the facility. The 2003 adult return to the hatchery totaled about 83,000 pinks, all but a very small portion taken for broodstock.

The release of 57.2 million pink salmon fry from the Port Graham Hatchery in the spring of 2003 was a considerable increase from the 6.6 million released the previous year and a record high release for the facility (Appendix A34). This record release generated an adult return forecast for 2004 of approximately 742,000 fish. The actual total return (hatchery cost recovery and broodstock) totaled 1.36 million fish, nearly twice the preseason forecast and a new record return to the hatchery facility. Almost the entire return (95%) was utilized for to recoup operational expenses, with the remaining 69,500 fish used for broodstock purposes. Hatchery personnel



estimated that an additional 5,000 pinks, believed to be of hatchery origin, entered nearby Duncan Slough to spawn. In the Port Graham River approximately 44,000 pink salmon were estimated as escapement, surpassing the upper limit of the established SEG range (Appendix A24). An estimated 36.3 million pink salmon fry were released from the Port Graham Hatchery in the spring of 2004 (Appendix A34), down from the record high of 57.2 million the previous year.

Although all efforts prior to 1993 were directed towards pink salmon, sockeye salmon production has also been underway at the Port Graham Hatchery. Since 1993, the facility has incubated sockeye salmon eggs collected from English Bay Lakes broodstock as part of that enhancement project, with the resulting fry destined for eventual release back into the lake system. Prior to 1993, eggs from this collection site were incubated at Big Lake Hatchery near Wasilla. After incubation and hatching at the Port Graham Hatchery, fry were transported back to the English Bay Lakes the following spring for either direct release or long-term rearing in net pens prior to release (for additional information, see the previous “**English Bay Sockeye Salmon Rehabilitation**” section).

In 2003, a hatchery permit alteration request (PAR) was submitted by the PGHC to allow development of a sockeye salmon return to marine waters near the village of Port Graham. The permit was eventually approved, allowing the corporation to collect up to 1.8 million sockeye eggs from English Bay Lakes broodstock for incubation at the Port Graham Hatchery (this figure is in addition to the 1.35 million permitted egg capacity for the separate English Bay Lakes sockeye project). The new project’s plans called for rearing the emergent fry in impermeable rearing pens, also known as “vertical raceways”, anchored in salt waters of Port Graham Bay near the hatchery facility. During the rearing process, fry will be fed while gradually being acclimated to salt water. Upon full salt water acclimation, fry will be transferred into salt water net pens, where rearing will continue until fry reach a size of 12 to 15 grams, at which time they will be released. This year, approximately 109,000 fry resulting from the 2003 egg take at English Bay “Second” Lake were reared in raceways at the Port Graham Hatchery facility and released into Port Graham Bay in September.

## **PAINT RIVER FISH PASS**

The Paint River system in the Kamishak Bay District contains at least 40 kilometers (25 miles) of potential salmonid spawning and rearing habitat. Currently the Paint River system is barren of salmon because of a waterfall at tide line that was impassable prior to 1993. ADF&G and CIAA initiated feasibility studies for a fishway in 1979. CIAA received State and Federal grant funds to build the fishway, completing construction in the fall of 1991. ADF&G Commissioner Carl Rosier declared the fish pass officially operational in January 1993.

To test the feasibility of developing a sockeye salmon return to the fish pass project site, the Paint River Lakes were first stocked with sockeye fry in 1986 and annually from 1988 through 1996, except in 1994 when no fry were available (Appendix A34). Because adult returns from these plantings proved negligible, CIAA discontinued fry stocking after the 1996 season (except for an experimental release in 2002, see previous heading “**Other Sockeye Salmon Lake Stocking**”). Due to the small numbers of annually returning fish, the Paint River fish pass has never opened to migrating adult salmon and no freshwater escapement has ever occurred.

## **2005 COMMERCIAL SALMON FISHERY OUTLOOK**

### **SOCKEYE SALMON**

Commercial sockeye salmon harvests in LCI during 2005 could approach 300,000 fish, which is about 30% greater than the recent 10-year average. Nearly three-fourths of the total sockeye harvest should be a result of continuing enhancement and lake stocking projects in LCI. Forecasted returns to enhancement sites at Leisure and Hazel Lakes in the Southern District during 2005 should return to more traditional levels, with a harvest projection of about 73,000 sockeyes anticipated at Leisure Lake/China Poot Bay and an additional 41,000 sockeyes expected at Hazel Lake/Neptune Bay.

Kirschner Lake in the Kamishak Bay District is expected to produce over 24,000 adult sockeyes in 2005. This projection is based on actual stocking rates combined with average assumed survival rates over the past decade. Stocking in other Kamishak Bay systems, such as Bruin, Ursus, and Paint River Lakes, has now been discontinued, and no returns are expected back to these systems in 2005. Despite the discontinuation of the stocking program at Chenik Lake in the Kamishak Bay District, the sockeye return to that system, and potential harvest opportunities, are questionable in 2005. It should be noted that the adult sockeye returns to that site in 2003 and 2004, completely due to natural production, were unexpectedly the strongest since 1993, leaving open the possibility that another strong return could produce a harvestable surplus.

The 2005 enhanced sockeye return to Bear Lake (fourteenth year of enhanced returns) is expected to produce a harvest of about 73,000 fish after accounting for broodstock and escapement requirements. A new management plan, adopted by the Alaska Board of Fisheries at their November 2004 meeting in Anchorage, specifies that the harvestable surplus is to be split equally between CIAA for hatchery cost recovery and the common property seine fleet.

The preseason forecast for English Bay Lakes in the Southern District calls for no harvestable surplus in 2005, resulting from low stocking levels and low smolt outmigration counts during previous years. The prediction for a weak return will likely dictate very restrictive management measures, including the potential for total closures, in both the commercial and subsistence set gillnet fisheries of Port Graham Subdistrict.

Based solely on average historical harvests, natural sockeye run projections for LCI could be expected to contribute up to 86,000 fish to commercial catches in 2005. Despite not reaching the preseason prediction during recent years, natural sockeye runs have nevertheless improved, with a concurrent improvement in both spawning escapements to and harvestable surpluses at most systems. The Southern District is expected to contribute the most to the harvest of non-enhanced stocks, while additional catches could come from the East Nuka Bay systems of Delight and Desire Lakes in the Outer District, Aialik Lake in the Eastern District, and Mikfik and/or Chenik Lakes in the Kamishak Bay District.

### **PINK SALMON**

Harvest of pink salmon in LCI during 2005 could exceed 3.4 million fish, with enhanced production expected to provide about half of the total. Tutka Hatchery in the Southern District is expected to contribute over 1.0 million pinks to commercial harvests, but since the facility has suspended all activities and will probably require all of its pink salmon return in order to meet revenue requirements, a directed common property harvest is not anticipated. The pink return to Port Graham Hatchery is projected to produce a harvest approaching 675,000 fish based on a

release of over 36.0 million fry 2004. Similar to Tutka Hatchery, all pinks returning to the Port Graham Hatchery will likely be utilized for broodstock and cost recovery purposes.

Natural pink salmon spawning escapement levels into most major LCI systems were considered good to excellent in 2003, contributing to a harvest projection of over 1.7 million naturally produced pinks throughout the entire LCI management area. The bulk of the predicted surplus is expected to occur at Ursus and Rocky Coves in the Kamishak Bay District and at Port Dick in the Outer District, with a number of other potential surpluses occurring in both districts. This relatively strong forecast, however, could be tempered by the recent history of erratic tender service, weak markets, and a lack of active buyers, and it remains questionable whether the harvest forecast of naturally produced pinks will be attained in 2005.

## CHUM SALMON

Based solely on recent years' average harvests (after 1988), the total LCI commercial chum salmon catch is projected to reach 35,000 fish during 2005. Chum runs have rebounded in recent years, however, resulting in commercial catches that exceeded the 2005 forecast figure during each of the past five seasons. This suggests that actual harvests during 2005 could be greater than the projection, and based on the recent years' pattern, the greatest potential for harvest opportunities will likely occur in the Kamishak Bay District. The LCI chum harvest will consist exclusively of natural production since chum salmon enhancement is no longer conducted in LCI.

## CHINOOK AND COHO SALMON

No formal harvest forecast is prepared for Chinook or coho salmon in LCI. However, average annual harvests since 1980 indicate that about 1,300 Chinook and 14,000 coho salmon can be expected to contribute to LCI commercial harvests in 2005.

Below are the projected harvest figures by species in the Lower Cook Inlet management area during 2005:

Species	Harvests of Enhanced Returns	Harvests of Natural Returns	Total Harvest
Chinook	<sup>a</sup>	<sup>a</sup>	1,300 <sup>a</sup>
Sockeye	211,200 <sup>b</sup>	85,500 <sup>c</sup>	296,700
Coho	<sup>a</sup>	<sup>a</sup>	13,600 <sup>a</sup>
Pink	1,695,500 <sup>b</sup>	1,737,500	3,433,000
Chum	0	35,000 <sup>c</sup>	35,000
Total	1,906,700	1,858,000	3,779,600

<sup>a</sup> Commercial harvest forecasts of Chinook and coho salmon represent average harvests since 1980 and are comprised of a combination of naturally-produced fish as well as fish produced from enhancement programs in LCI; no attempt is made to separate the two components.

<sup>b</sup> Includes common property plus cost recovery harvests.

<sup>c</sup> Harvest forecasts for naturally-produced sockeye and chum salmon are simply average commercial harvests since 1980 and 1989, respectively.

## **2004 SUBSISTENCE AND PERSONAL USE SALMON NET FISHERIES**

### **KACHEMAK BAY PERSONAL USE SET GILLNET FISHERY**

The Southern District (Kachemak Bay) fall coho salmon gillnet fishery dates back prior to statehood under varying names, labeled as a “personal use” fishery during the years 1986-1990, 1993, and 1995-present, and as a “subsistence” fishery in 1991, 1992, and 1994. Numerous court rulings affected the status of this fishery during the 1980’s and 1990’s, causing it to change in status between the two categories. The most recent court action, after the 1994 fishery, reestablished the “subsistence” and “non-subsistence” areas originally created by the Alaska Board of Fisheries (BOF) in 1992, and because most of Kachemak Bay was included in a “non-subsistence” area, the subsistence fishery and the regulations governing it were no longer valid. The BOF re-adopted personal use regulations governing this fishery into permanent regulation for the 1995 season and rescinded the subsistence regulations formerly governing the fishery. Those personal use regulations have remained in effect since that time.

The target species in the Kachemak Bay gillnet fishery is coho salmon, with returning fish a mixture of natural stocks primarily bound for the Fox River drainage at the head of Kachemak Bay and enhanced runs bound for the Homer Spit fishing lagoon. The regulations governing the fishery are found in the Personal Use Coho Salmon Fishery Management Plan (**5 AAC 77.549**). The BOF last addressed this fishery during its 1998 meeting in Homer. After hearing the staff’s concerns regarding the harvest of wild stocks of cohos, the BOF adopted a change to the regulatory guideline harvest range (GHR), from a former range of 2,500 to 3,500 coho salmon to a new range of 1,000 to 2,000 cohos. The new GHR was implemented for the first time during the 1999 season. Incorporated into the management plan is a requirement that cohos taken during the earlier Seldovia area subsistence salmon fishery be included as part of the personal use guideline.

All other regulations from the previous year’s fishery remained essentially unchanged for the 2004 personal use fishery. Legal gear was limited to a single set gillnet not exceeding 35 fathoms in length, 45 meshes in depth, and 6 inches in mesh size. Nets were not permitted more than 500 feet from the mean high water mark, and a net could not be set offshore of another net. A permit from the Homer office was required, with an Alaska resident sport fishing license necessary to obtain a permit. The seasonal limit was 25 salmon per head of household and 10 additional salmon per each dependent. There were two scheduled 48-hour fishing periods each week, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and Thursday 6:00 a.m. until Saturday 6:00 a.m., and by regulation the Southern District personal use salmon set gillnet fishery opens August 16. Prior to 1991, little Department management interaction occurred and the fishery often proceeded until the regulatory closing date of September 15, regardless of the harvest level. Between 1991 and 2003, years of intensive management for the GHR, fishing time allowed in this fishery ranged from 72 to 192 hours or one and one-half to four regularly scheduled fishing periods.

Only four cohos were reported during the early August Seldovia subsistence fishery, therefore the GHR remained at 1,000 to 2,000 fish for the personal use fishery. Prior to the opening on August 16, the Department requested voluntary daily reporting from each permit holder during the fishery, as has been the case since 1991. Catch information reported after the first 48-hour period indicated a catch of almost 900 coho salmon harvested by only 30% of the permit holders,

nearly achieving the lower end of the GHR and suggesting an exceptionally strong coho return. Using this information, as well as data collected from past personal use fisheries, Department staff projected that the catch would fall near the middle to upper end of the GHR by the end of the second fishing period. Therefore, the 2004 Personal Use Coho Salmon Fishery was closed by emergency order at 6:00 a.m. Saturday, August 21, for the remainder of the season after 96 hours of fishing time.

A total of 91 permits were issued for the 2004 fishery (Appendix A29), while 82 permit holders (90%) phoned in their catches or returned their permits. Of the total number issued, 64 permit holders (70%) actively fished, 18 (20%) did not fish at all, and the remaining 9 permit holders (10%) did not report or return their permit (Appendix A29). Based on returned permits and voluntary catch reports, the harvest was estimated to be 1,554 coho salmon, 172 pink salmon, 56 sockeye salmon, 7 Chinooks, and 16 chums (Appendix A29). The coho total represents the midpoint of the GHR of 1,000 to 2,000 fish.

The number of permits issued for the 2004 Southern District personal use fishery (91) was the lowest since 1970 (Appendix A29), well before production from Kachemak Bay coho enhancement programs began contributing to the fishery. The percentage of permits that actually fished, at 70% of the total issued (or 64 of 91 permits), was lower than the record high of 78% in 1994 but was nearly identical to the recent 10-year average. Perhaps more importantly, only 23 permits fished on the Homer Spit this season, compared to an annual average number of 55 permits fished there since 1999. The coho harvest of 1,554 fish fell midway within the GHR and was greater than the 2003 catch of 1,071 fish but similar to the 2001 and 2002 fisheries. This year's total catch was slightly less than the 1,605 fish average annual harvest between 1999 and 2003, years that the personal use fishery was managed for the lower 1,000 – 2000 coho GHR.

The duration of the 2004 Southern District personal use fishery, at 96 hours of fishing time, was considerably less than the 192 hours allowed the previous year but just slightly less than the 1991 – 2003 average of 114 hours. Both the number of permits issued and the active fishing effort continued to display a downward trend experienced over the past five years, and the number of permits actively fished in 2004 was the lowest total since 1974 (Appendix A29). Reasons for the declining trend in participation are likely due to the popularity of other alternative personal use fisheries in Upper Cook Inlet targeting sockeye salmon. Permits for, and catches in, the personal use fisheries north of Homer (e.g. the Kasilof and Kenai River dip and set gillnet fisheries) have been relatively high in recent years. Since current regulations prohibit issuance of more than one Cook Inlet personal use permit to a household in any calendar year, individuals must choose only one Cook Inlet fishery in which to potentially participate. Many individuals now choose to forego the LCI coho fishery and instead participate in one of the Upper Cook Inlet personal use sockeye fisheries, perhaps due to a preference for sockeyes over cohos, or perhaps due to a preference for dip netting as opposed to set gillnetting.

In an effort to provide additional sport fishing opportunities and continuity with the earlier return of Chinook salmon to the Homer Spit fishing lagoon, the ADF&G, Sport Fish Division, has stocked coho salmon with both early (Ship Creek brood) and late (Bear Lake brood) run timing characteristics since 2001. Adults resulting from the early run release return as early as the third week of July, which roughly coincides with the end of the enhanced Chinook return. The midpoint of the early run coho return is approximately mid-August and closely corresponds with the regulatory opening date of the personal use fishery, while the midpoint of the late run return is approximately the end of August. The overlapping run timing windows of the combined early

and late run coho returns likely tends to increase catch rates in the personal use fishery, particularly during the first 24-hour period.

Due to the abbreviated nature of the personal use fishery since 1991, the staff made a concerted effort prior to this season's opening to inform the public of the anticipated short duration, which has become common knowledge among experienced local participants. Although this prior knowledge of the brevity of the fishery usually leads to intense competition for desirable fishing sites along the east side of the Homer Spit, the reduced participation in the fishery this season once again tempered the competitive character. Nonetheless, this area continues to remain the most sought after location to fish, undeniably due to the coho enhancement project at the Homer Spit fishing lagoon. As expected, the most fishing success this season occurred in those waters adjacent to the Homer Spit enhancement lagoon. Surprisingly in 2004, the cumulative catch from waters along the north shore of Kachemak Bay from Mud Bay to Fritz Creek, which formerly produced strong catches during years of Caribou Lake enhancement but have been significantly weaker since, were the highest for this specific area since 1996.

Prior to enhancement, the Spit was considered only average in terms of harvest productivity. The Spit's easy road access and the enhanced coho returns have at times combined to incite fishermen to clamor for fishing sites on the Spit, a situation which resulted in numerous violations during some previous gillnet fisheries. The last time that Alaska Bureau of Wildlife Enforcement (ABWE) officers issued citations during this fishery was in 1994. Since then, numerous verbal warnings have been issued, and many complaints received via telephone in the Homer ADF&G office regarding infractions. This year ABWE officers were on site for the beginning of the fishery, and as is usually the case, the presence of these uniformed officials generated relatively expedient voluntary compliance. As a result, no formal citations were issued.

The lower GHR implemented in 1999 appears to have succeeded at protecting the majority of naturally produced cohos by prompting a fishery closure prior to the peak of those stocks' migration. Although no tagged adult fish returned to the enhancement lagoon this year, tag recovery analysis from the 2000 personal use fishery indicated that approximately 80% of the cohos caught during the set gillnet fishery were of hatchery origin. This information, when combined with a personal use coho harvest near the mid-point of the 1,000 – 2,000 fish GHR, suggests that a relatively small number of wild stock fish were likely taken in the gillnet fishery this year.

Overall run strength of coho returns to Kachemak Bay this year was estimated to be average or slightly better than average. Sport and commercial catches are normally utilized as indicators of run strength, and although commercial catches in the Southern District of LCI were lower this season than in recent years, the recent weak markets and lack of directed effort tends to impart ambiguity to this statistic. Informal observations conducted in the local sport fishery by Sport Fish Division staff indicated relatively strong returns to the enhancement lagoon. This year's only aerial survey of Clearwater Creek, the major coho index stream at the head of Kachemak Bay, also suggested reasonable returns of wild stock cohos to the area. Approximately 1,100 cohos were estimated on the September 8 survey, a figure considered good for this drainage by historical standards.

The 2004 catch of seven Chinook salmon (Appendix A29) was the lowest since 1993 and considerably lower than the long term average (1969-2003) of 52 fish. The declining trend observed in the harvest of this species in the personal use fishery over the past several years can

clearly be attributed to the discontinuation of the Sport Fish Division program to stock late run juvenile Chinook salmon after 1999. Because of this, catches of Chinook salmon are expected to remain low in future personal use fisheries.

Catches in the 2005 personal use fishery are expected to be comparable to the previous six-year period, 1999-2004, a period when adult returns from Caribou Lake enhancement no longer contributed to the fishery. However, the length of time to achieve a harvest within the GHR is difficult to forecast, particularly when comparing this year's relatively short fishery (96 hours) to that of last year's 192 hours. Additionally, run timing of the earlier returning stocked cohorts should hypothetically serve to reduce the length of time needed to achieve a harvest within the GHR. This in turn would provide further protection to the wild stock coho salmon bound primarily for the Fox River drainage at the head of Kachemak Bay, which exhibit a later run timing. However, low participation and effort levels in, and thus a longer duration of, the 2005 fishery could easily negate the previous statement. Once again, other alternative personal use fisheries elsewhere in Cook Inlet will likely impact effort levels in the LCI fishery. Although limited as an inseason management tool, voluntary catch reports will once again be employed to help determine an appropriate closure time. Based on experience gained during the past 14 years' fisheries, and especially that of the past six seasons, it should be possible to keep the harvest within the GHR.

#### **NANWALEK/PORT GRAHAM SUBSISTENCE FISHERY**

One of Lower Cook Inlet's two subsistence fisheries during 2004 occurred near the villages of Nanwalek (formerly English Bay) and Port Graham, located approximately 21 nautical miles southwest of Homer on the south side of Kachemak Bay (Figure 2). Gear in this fishery is limited to set gillnets. Most fishing occurs within close proximity to the respective villages, primarily targeting sockeye salmon returning to the English Bay Lakes system early in the summer, although participants will occasionally target pink salmon returning to Port Graham and English Bay Rivers later in the summer. Some additional fishing also occurs in Koyuktolik ("Dogfish") Bay, located about seven nautical miles south of English Bay, targeting non-local stocks of Chinook salmon as well as local stocks of chum salmon. Despite being open to fishing for each of the past three seasons, waters of Port Chatham and Windy Bay Subdistricts also provide opportunity for participants to meet subsistence requirements but have not experienced any known effort.

The sockeye salmon run to English Bay Lakes was severely depressed for much of the late 1980's and early 1990's, with returns failing to achieve the minimum escapement goal for nine consecutive years between 1985 and 1993 (Appendix A23). More recently, returns have been bolstered in some years as a result of a rehabilitation/enhancement project initiated by ADF&G and subsequently taken over by the Nanwalek Salmon Enhancement Project (NSEP) in conjunction with Chugach Regional Resources Commission (CRRC) and the village of Nanwalek. However, disease outbreaks in the lake-rearing portion of the program, coupled with erratic adult behavior that caused difficulty in capturing broodstock, have plagued the program and led to inconsistent adult returns.

With only 18,000 adult sockeyes forecasted to return to English Bay Lakes in 2004, and an established SEG range of 9,400 – 16,900 fish, the commercial set gillnet fishery in waters of Port Graham Subdistrict, including both the Port Graham and English Bay Sections, was kept closed at the start of the commercial season in early June. However, the subsistence season in the same waters was allowed to open by regulation on April 1, and remain open during the sockeye return,

so residents could attempt to meet their subsistence needs by targeting the small expected surplus of sockeyes destined for English Bay Lakes. ADF&G, Subsistence Division, end-of-year summaries indicate that the all-species salmon harvest for the village residents of Port Graham cumulatively totaled nearly 1,900 fish in 2004, much lower than last year's catch of 3,200 fish (Appendix A31), which was the highest for the past two decades. For the village of Nanwalek, the total all-species catch of 5,200 fish nearly matched the 2003 catch of 5,600 fish but was considerably less than the record high of 13,400 fish in 2002 (Appendix A32). Sockeyes comprised the bulk of this year's subsistence catch at 57% (3,000 fish) for Nanwalek and 31% (600 sockeyes) for Port Graham. The enumeration weir operated by NSEP at English Bay River monitored sockeye escapement inseason, as has been the case since 1994, with a final escapement estimate of 16,700 fish (Table 3, Appendix A23), surpassing the upper end of the 6,000 – 13,500 fish desired inriver goal. It should be noted that NSEP collects hatchery broodstock from English Bay Lakes' sockeye escapement, with a total of 1,390 fish captured for this purpose in 2004, thus reducing the effective lake escapement to approximately 15,350 sockeyes.

Because of sub-par salmon returns to the Port Graham Subdistrict in some recent seasons, village residents have sometimes encountered difficulty meeting their subsistence salmon needs when restricted to fishing only in the Port Graham and Koyuktolik Subdistricts. Consequently, a proposal to add the previously mentioned waters of Port Chatham and Windy Bay to these areas open to subsistence fishing was submitted to the Alaska Board of Fisheries (BOF) at their November 2001 meeting. The BOF amended and subsequently adopted the proposal, allowing fishing weekly from 10:00 p.m. Thursday to 10:00 a.m. Wednesday between April 1 and September 30 in waters of Port Graham and Koyuktolik Subdistricts. However, in waters of Port Chatham and Windy Bay Subdistricts, the BOF established identical weekly fishing periods but chose season dates for these two subdistricts from April 1 until August 1 to protect returning coho salmon in those waters. No subsistence fishing effort or harvest has been known to occur in Port Chatham or Windy Bay Subdistricts since these areas were first opened to fishing in 2002.

### **SELDOVIA AREA SUBSISTENCE SALMON GILLNET FISHERY**

The set gillnet fishery in waters near Seldovia on the south side of Kachemak Bay in 2004 was the ninth year of Lower Cook Inlet's newest subsistence salmon fishery. Established by the BOF at their LCI meeting in the fall of 1995, the fishery was designed to primarily target non-local stocks of Chinook salmon as they transited these waters. In considering initial seasons and bag limits, the BOF carefully restricted the fishery to reduce potential interception of enhanced Chinook salmon bound for a popular stocking site in the Seldovia small boat harbor. These enhanced fish were intended to principally benefit sport fishermen and were not considered "customary and traditional" for subsistence purposes.

Regulations in the fishery included a "split" season, the first occurring from April 1 through May 30 and the second occurring during the first two weeks of August. A guideline harvest limit of 200 Chinook salmon was established for the early season, while the annual possession limit was set at 20 Chinooks per household. During the April/May season, fishing was allowed during two 48-hour periods each week, while in August the fishery was only open during the first two weekends of the month. Waters open to fishing included those along the eastern shore of Seldovia Bay as well as a short stretch of water outside of Seldovia Bay proper just west of Point Naskowhak (also called the "outside beach"). Gear was limited to set gillnets not exceeding 35 fathoms in length, 45 meshes in depth, and six inches (stretched) mesh size, identical to gear regulations governing the nearby Port Graham/English Bay subsistence fishery. A permit issued by the Department was required prior to



fishing, and catches were to be recorded on the permit and also reported to the Department's Homer office inseason so that cumulative harvest totals could be monitored.

A total of 13 permits were issued for the early season, while one permit was issued for the August season. Because most fishermen ignore the requirement to call in their catches during the open season, inseason harvests are typically underreported. At the close of the early season, 10 of the 13 permits were returned to the Department as required by regulation, and catches were determined from records on each permit. For the early season, nine of 13 permit holders (69%) actively fished, one (8%) did not fish, and three permit holders (23%) failed to return his/her permit (Appendix A33). The reported salmon catch for the early season totaled 89 Chinooks, 63 sockeyes, and 15 chums (Appendix A33), while in the late season, the single permit holder reported a harvest of four cohos.

The 2004 early season all-species Seldovia subsistence harvest of 169 fish was the third lowest since the fishery was established, with only the first two years (1996 and 1997) recording a lower catch (Appendix A33). Chinook salmon comprised the majority of the catch at 53%, followed by sockeyes at 37%. The sockeye catch this season represented only about half of the historical average, reflecting the weak overall trend of sockeye returns to Southern District systems. The record catch for both species occurred in 2000 when 189 Chinook and 249 sockeye salmon were harvested (Appendix A33).

The Seldovia subsistence fishery in 2005 is expected to be similar to those of the past six years. With the fishery now relatively well-established, knowledgeable fishermen have learned the most productive fishing sites and successful techniques. Based on these factors, the harvest during the early season could approach or exceed the guideline harvest limit in 2005.

## **2004 COMMERCIAL HERRING FISHERY**

### **INTRODUCTION**

Similar to the salmon fishery, commercial herring fishing in LCI has historically occurred in four of the five management districts, with the Barren Islands District the sole area where commercial herring fishing has not occurred (Figure 1). LCI herring fishing first began in the Southern District in 1914 with the development of a gillnet fishery within Kachemak Bay. Eight saltries, including six near Halibut Cove, were operating during the peak of the fishery. A purse seine fishery in Kachemak Bay began in 1923, but after three successive years of average annual harvests approaching 8,000 short tons (st; 1 short ton = 2,000 pounds), herring populations, and hence the fishery, collapsed.

The next LCI herring fishery began in 1939 and was centered in the Resurrection Bay and Day Harbor areas of the Eastern District (Figure 1). Product from this purse seine fishery was used exclusively for oil and meal reduction. Although the fishery continued through 1959, peak harvests occurred from 1944 to 1946, averaging 16,000 st each of those years. After this time period, stocks sharply declined, apparently due to over-exploitation.

## **HISTORY AND DEVELOPMENT OF THE SAC ROE FISHERY**

### **Introduction**

Japanese market demand for salted herring roe resulted in the development of a sac roe fishery in the 1960s. The relatively high prices paid to fishermen caused rapid expansion of the fishing fleet and harvest, and efforts to manage the resource frequently encountered difficulty keeping pace with this strong market demand and growth. In order to decrease the risk of a stock collapse and to sustain the fishery, the Department established conservative management strategies and guideline harvest levels. Following a period of suspected over-exploitation, herring stocks throughout LCI generally declined after 1973. Concern over the declining trend led the Alaska Board of Fish and Game, prior to the start of the 1974 season, to establish a quota of 4,000 st for all of LCI.

Historically the only allowable gear type in the LCI herring sac roe fishery has been purse seine. The limited entry permit system for sac roe herring seining in Cook Inlet was implemented in 1977, and at the present time 74 permanent and two interim use permits are issued for the management area.

### **Outer/Eastern Districts**

During the early years of sac roe herring fishing in LCI, seining occurred primarily in the Outer and Eastern Districts (Figure 1), with the majority of effort and harvest once again concentrated in Resurrection Bay of the Eastern District. The first major harvest occurred in 1969, when 760 st of herring were taken in the Eastern District. The catch increased dramatically in 1970 to a record high of 2,100 st in this district, but the stocks, and resultant harvests, declined over the next three seasons. The Alaska Board of Fish and Game allocated 1,000 st from the total LCI quota of 4,000 st to each of the Outer and Eastern Districts beginning with the 1974 season. However, stock abundance continued to decline and these quotas were never achieved. As a result, the Outer and Eastern Districts were closed to herring fishing from 1975 to 1984.

In 1985, the sac roe fishery was allowed to resume in the Outer and Eastern Districts on a very conservative basis, even though no noticeable change in spawning biomass had been observed. Because of the stocks' reduced abundance and extreme vulnerability to fishing, guideline harvest levels were set at 150 to 200 st for each of the four fishing areas created within these two districts. Fishing effort in 1985 was minimal and the majority of the harvest (216 st) once again was taken in Resurrection Bay. Only limited and sporadic harvests occurred in these two districts after 1985, with the majority of both the herring catch and the observed biomass comprised of fish age 4 and younger.

Despite considerable opportunity for exploratory fishing on a daily basis in the Outer and Eastern Districts during 1991 and 1992, the predominance of juvenile herring and the history of marginally acceptable roe recoveries from fish caught in these areas contributed to a lack of interest by fishermen and processors. These conditions prevailed from 1993 through 2001 and, consequently, the Outer and Eastern Districts were not opened to purse seining in any season during that nine-year period. At their November 2001 meeting, the Alaska Board of Fisheries (BOF) closed these districts to commercial herring fishing by regulation and simultaneously adopted a management plan containing seven specific criteria that must be addressed prior to allowing any commercial herring fishing in the Outer and/or Eastern Districts. Thus, no harvest or effort occurred in the Outer and Eastern Districts during the 2004 season.

## **Southern District**

Sac roe herring seining in the Southern District began in the early 1960s, but catches were sporadic and relatively insignificant until 1969. That year, over 550 st were taken, followed the next season by a district record high harvest of 2,700 st. Commercial harvests continued during the 1970's, albeit at much lower levels, but observed low abundance of herring during the past 20 years has virtually precluded commercial openings in the Southern District. The only exception occurred in 1989, when 10 vessels in a single 2.5-hour opening harvested 170 st of herring (Appendix B1) averaging 8.9% roe recovery.

Similar to the Outer and Eastern Districts, the BOF expressed concern for the herring stock in the Southern District and responded at their November 2001 meeting by closing the Southern District to commercial fishing by regulation, including it in the previously mentioned management plan adopted for the Outer and Eastern Districts. Under the new plan, the BOF must address seven specific management considerations prior to allowing a commercial herring fishery in this district.

## **Kamishak Bay District**

Since 1973, the majority of LCI sac roe harvest and effort has occurred within the Kamishak Bay District (Figures 1 and 7). Historical commercial harvests ranged from a low of 240 st taken in 1973 to a high of 6,100 st taken in 1987 (Appendix B1), with estimated exvessel values ranging from \$70,000 to \$9.30 million (Appendix B2). After the initial harvest in 1973, Kamishak Bay herring catches increased dramatically over the next three years, peaking at 4,800 st in 1976. Harvests dropped sharply during the ensuing three seasons, and by the end of the decade the stock had declined to a point that the Kamishak Bay fishery was closed entirely beginning with the 1980 season.

Although the Kamishak Bay District herring season remained fairly constant during the 1970's, roughly from late April through June, a significant management change occurred during this time. From 1973 through 1977, the fishery was basically "open season until closed", but in 1978 it was changed to "closed season until opened by emergency order" (Appendix B3). This change required more active assessment of the herring stock by the Department in order to determine appropriate opening times and harvest levels.

The Kamishak Bay herring stock appeared to respond positively and rebuild rather quickly following the 5-year closure that began in 1980. The fishery was reopened in 1985, with a resulting harvest of 1,100 st that season (Appendix B4). Beginning in 1985, the commercial fishery in Kamishak Bay District was regulated to achieve a 10% to 20% exploitation rate mandated by the Board of Fisheries. From 1985 through 1989, harvests averaged about 3,900 st, with a peak catch of 6,100 st in 1987 (Appendix B1). By 1989, fishing efficiency had increased to a level where intensive regulatory management was required to maintain harvests within guideline levels, to direct the fishery at herring aggregations with high quality roe, and to protect younger age herring from harvest.

Management of the Kamishak Bay District between 1990 and 1997 stabilized the average harvest at roughly 40% of the 1987 record high catch. However, hindcast biomass estimates generated by an age-structured-assessment (ASA) model show that stocks were declining steadily throughout the decade (Appendix B4, Figure 14), and by 1998 the cumulative commercial herring catch in the Kamishak Bay District totaled only 300 st despite several

extended district-wide openings. The fishery was closed beginning with the 1999 season due to low abundance levels and has remained closed since.

The initial Kamishak Bay District Herring Management Plan (KBDHMP) was formally adopted into regulation beginning with the 1993 season. Highlights of the original plan included a minimum biomass threshold of 8,000 st, a maximum exploitation rate of 20% (scaled depending on the forecasted biomass), and a management strategy intended to limit the harvest of herring age 5 and younger. In addition, because the spawning stock of Kamishak Bay herring is believed to reside in waters of north Shelikof Strait in the Kodiak Management Area for at least a part of the year, the KBDHMP dictated that 10% of the allowable harvest of Kamishak Bay herring be allocated to the Shelikof food/bait fishery.

At the November 2001 BOF meeting, Department staff proposed amendments to the KBDHMP in order to make it more conservative. The two key components of the new plan included a reduction in the maximum exploitation rate allowed in the fishery, from a former level of 20% of the forecasted herring biomass to a new level of 15%, and a reduction in the biomass threshold (the minimum volume necessary in order to allow a fishery) from 8,000 st to 6,000 st. The staff reasoned that the decreased exploitation rate, although equating to a smaller annual harvest for the fleet, would help to preclude the extended closures that have plagued the Kamishak Bay commercial herring fishery since its inception. The new threshold level was the result of a biomass threshold analysis conducted by the LCI research staff (Otis, 2001). After careful review, the BOF unanimously adopted the amended KBDHMP into regulation.

## **2004 HERRING SEASON OVERVIEW**

### **Assessment Methods**

The primary method of herring biomass assessment in LCI is the aerial survey. Aerial surveys are conducted annually throughout the herring spawning season in the Kamishak Bay and Southern Districts, from late April through early June, to determine relative abundance and distribution of herring. Because a commercial herring fishery has not occurred in the Outer and Eastern Districts in many years, and is not likely to occur in the near future, aerial surveys of these areas are no longer conducted. Additionally, the size of the area and the characteristically poor weather in the Gulf of Alaska precludes surveys on a regular basis and makes aerial biomass estimation in these districts impractical and expensive. Data collection methods in the Kamishak Bay and Southern Districts are consistent between seasons, with numbers and distribution of herring schools, location and extent of milt, and visibility factors affecting survey results recorded on index maps for each survey. Three standard conversion factors are used to estimate herring biomass based on each 538 ft<sup>2</sup> (50 m<sup>2</sup>) of school surface area sighted and the following water depth parameters: 1) 1.52 st for water depths of 16 ft or less; 2) 2.56 st for water depths between 16 and 26 ft; and 3) 2.83 st for water depths greater than 26 ft (Lebida and Whitmore 1985).

Due to invariably poor weather and water clarity, aerial surveys rarely provide reliable estimates of total herring biomass returning to Kamishak District Bay waters (Otis et al. 1998). As a result, an age-structured-assessment (ASA) model has been used for the past eleven years to forecast herring abundance for Kamishak Bay, as well as to “hindcast” previous years’ total abundance. This dynamic model incorporates a variety of heterogeneous data sources including: time’s series of commercial catch age composition; total run age composition; and aerial survey biomass estimates from years with adequate survey conditions and coverage. The model simultaneously minimizes the differences between expected and observed return data for each of its components,

updates hindcasts of previous years' abundance, and returns a forecasted estimate of the following year's return.

Another tool the Department annually utilizes to aid in herring assessment in the Kamishak Bay District, and opportunistically in the Southern District, is a chartered commercial seine vessel. In years when no commercial fishery occurs, the Department is unable to utilize the fleet to collect samples for age composition analysis. By chartering a commercial purse seine vessel, samples and other related information can be collected and used to further aid in understanding the dynamics of the herring stocks. As long as sufficient funding is available, separate sampling charters are conducted to sample different portions of the spawning migration (early and late). In years when a fishery occurs (traditionally in the early part of the migration), a single "late season" sampling charter is employed to obtain a more complete picture of the overall return. Hydroacoustic observations and water temperature/depth parameters are concurrently accumulated during the charters. The information gathered during these sampling efforts provides age class data that: 1) allows the staff to generate an age composition estimate of the overall biomass observed by aerial surveyors throughout the entire duration of the spawning migration; and 2) facilitates the evaluation of the relative strength of recruiting year classes. This is critical in generating the annual herring forecast. The charters further serve to informally verify the relative magnitude of herring biomass observed by aerial surveyors.

### **Kamishak Bay District 2004 Season Summary**

Aerial survey coverage for Kamishak Bay in 2004 was considered fair to poor, while overall observation conditions were considered fair. A total of eight surveys were completed in the Kamishak Bay District between April 20 and June 1. Several 6- to 9-day "gaps" in coverage, or periods during which no surveys were flown due to poor weather, occurred in 2004. Based on historical observations, the arrival of herring in 2004 was considered later than normal for the district, with fish first documented during a survey on April 26 when less than two tons were estimated in Bruin Bay. The highest daily biomass estimation during the seasonal surveying period was made on the season's final survey June 1, with a cumulative estimate of about 344 st made on that date. Just over two-thirds of that survey's total biomass was observed in the Iniskin Bay index area, in the north end of the district, followed by the Oil Bay area with about 9% of the total.

Only three sightings of spawning activity occurred during surveillance flights in 2004, considered relatively normal by recent standards but cumulatively amounting to less than one linear mile of spawn. Due to the often sporadic schedule of surveillance flights, however, no correlation between documented spawning and herring abundance was attempted. Therefore, the low number of spawn sightings this year is not in itself considered indicative of a weak herring return.

The relatively poor assessment coverage in 2004 resulted in a cumulative total of less than 900 st of herring observed by Department surveyors in the Kamishak Bay District this season, by far the lowest volume in the past 13 years. The last four consecutive years of disappointingly low aerial survey abundance indices indicate the lack of a significant herring recruitment event in Kamishak Bay during any recent season. This contrasts with other North Gulf of Alaska herring populations, including Kodiak and Prince William Sound, which have experienced population growth due to strong recruitment events in recent years. One hypothesis for the lack of recruitment in Kamishak Bay originates from the relatively poor condition of the fish observed recently, characterized by low average weights-at-age, which can lead to higher than normal mortality. Another theory speculates that herring may not always return to their birthplace to spawn. This

premise is based on the concept that, upon first achieving sexual maturity, the younger herring may simply follow older repeat spawners in a given school back to a spawning area, even if that area is not where the younger fish were originally spawned.

Reasonably good weather once again contributed to successful coverage by the Department's two spring vessel charters to collect age composition samples during the periods April 27 – May 5 and May 15 – 22. The early sampling period coincided with the arrival of the first fish on the grounds, which in turn corresponds to the traditional timing of the commercial fishery, while the second charter collected age composition samples during the latter portion of the return in 2004. During the 17 days spent in the district, the contracted vessel made a cumulative total of five sets that resulted in the successful collection of over 1,500 fish for age/weight/length (AWL) analysis. Unfortunately, information and samples collected from the two charters corroborated the overall low abundance of the population observed by Department aerial surveyors, while additionally confirming the low recruitment of new fish.

Based on hindcast estimates, herring biomass has been steadily declining in Kamishak Bay over the past 20 years. The ASA model estimated the total 2004 return at just over 2,500 st (Table 12, Figure 14, Appendix B4), the lowest figure in the past two decades. Recruitment into the spawning population did occur in 2004, but the magnitude of this recruitment was not as great as was hoped. Nonetheless, postseason data analysis of test fishing samples indicate that the overall return this season was dominated by fish age 5, age 3, and age 8 at 23%, 16%, and 15% of the biomass by weight, respectively (Table 12, Figure 14). While the 1996 and 1997 cohorts each appeared relatively strong at approximately 12-15% of the total biomass, they were estimated to be less than one-quarter of the size of the very strong 1988 cohort that supported the commercial fishery throughout most of the 1990s.

### **Southern District 2004 Season Summary**

A total of four aerial surveys of the Southern District were flown between April 30 and May 21 in 2004, all conducted under good conditions. The 2004 run biomass, estimated as the sum of all daily biomass estimates, totaled only 397 st, which was considerably less than any recent year's estimate. The low number of surveys conducted this season matched the number flown in 2003, yet the biomass figure for 2004 was lower still than the paltry 558 st observed in 2003. The peak 2004 individual biomass survey (264 st) occurred on May 4, with the majority of herring observed that day in the Glacier Spit index area. Peak surveys in areas where herring historically have been observed were as follows: Mallard Bay, 21 st on May 21; east of the Homer Spit/Mud Bay, 53 st on May 4; and Glacier Spit/Halibut Cove, 210 st on May 4. As has been the persistent trend over the past two decades, low abundance levels in the Southern District, combined with the newly adopted regulatory management plan mentioned previously, precluded any commercial fishing during the 2004 season.

### **Outer/Eastern District 2004 Season Summary**

As in previous recent seasons, no herring assessment occurred in the Outer and Eastern Districts during 2004. Unlike the Southern and Kamishak Bay Districts, historical samples from the Outer and Eastern Districts have contained up to 14% age-2 (sexually immature) herring. Formal sampling has not occurred in recent years and was very limited in previous years. However, two small, informal samples of herring from two separate schools observed aurally in Day Harbor (Eastern District, late June) and Port Dick (Outer District, early July) were obtained by handline jigging during the 2000 season. Scales were not collected for age composition analysis, but the size of all

fish caught suggested that they were age-2 juveniles. No discernible shift to older age herring has ever been observed in this area, suggesting the possibility that the Outer and Eastern Districts may be feeding and rearing grounds for juvenile fish from another area.

## **RECENT HERRING RESEARCH IN LOWER COOK INLET**

Two additional research projects were recently undertaken to better understand Kamishak Bay herring stock structure and its relationship to other North Gulf of Alaska herring stocks. The KBDHMP dictates that 10% of the allowable harvest for Kamishak Bay be allocated to the Shelikof food/bait fishery because it appears these two stocks mix during part of the year around the north end of Shelikof Strait (Johnson et. al. 1988; unpublished data). The extent to which these stocks intermix is poorly understood, however, the ramifications of their mixing greatly complicate the assessment and management of each stock. Therefore, the Department successfully applied for a grant from the Exxon Valdez Trustee Council (EVOS-TC) to investigate the feasibility of using two relatively new stock identification techniques, fatty acid composition of heart tissue and elemental composition of otoliths, to distinguish between several Alaska herring stocks. Representative samples were collected from Sitka, Prince William Sound, Kamishak, Kodiak, and Togiak spawning aggregations during the spring of 2001. Chemical analysis of those samples was completed during 2002. Results showed that fatty acid composition of heart tissue has the potential to become a reliable stock identification biomarker. Using discriminate analysis, 157 of the 163 samples taken were correctly identified to their original herring stock. Unfortunately, stocks could not be reliably distinguished using the elemental composition of otoliths. Project findings have been documented in a manuscript that was recently submitted for publication in a peer-reviewed journal.

The second recent research project undertaken by the Department also stems from an alternative funding source. In 2002, the National Marine Fisheries Service funded a Department project to synthesize all of the historical Kamishak Bay herring stock assessment and commercial fishery data into a geo-referenced database. Much of this historical information, dating back to 1973, previously existed only in hard copy form on aerial survey field maps. The Department captured those data into electronic maps, making them available for a variety of more in-depth analyses. The completed database is available on CD-ROM and is updated annually with new information.

## **2005 HERRING SEASON OUTLOOK**

### **Kamishak Bay District**

The forecasted herring biomass generated by the ASA model for 2005 in the Kamishak Bay District is 3,058 st (Table 12, Figure 14). This total falls below the KBDHMP regulatory threshold of 6,000 st for which a commercial harvest can be considered. Additionally, nearly 50% of the predicted return by weight in 2005 should be comprised of fish age 5 and younger, with the single age-3 year class projected to make up almost one-fourth of the overall return (Table 12, Figure 15). Since the KBDHMP directs the Department to limit the harvest of fish age 5 and younger, and because the forecasted abundance falls below threshold, the sac roe fishery in the Kamishak Bay district will remain closed for the 2005 season. The resource, and hence the commercial fishery, is best served by protecting the remaining spawning population in order to rebuild it to a harvestable level.

Without a commercial fishery in 2005, the Department's ability to collect age composition information will be greatly reduced. The Department expects to once again obtain samples using

a chartered commercial seine vessel throughout the duration of the 2005 run, with sufficient funding expected for both an early and a late season charter. The Department will also attempt to conduct comprehensive aerial surveys throughout the spawning season, from mid-April to early June, as conditions permit.

### **Other Districts**

Based on the persistent trend of low herring abundance in the Southern District and a historical preponderance of juvenile herring in the Outer and Eastern Districts, as well as the stipulations contained within the Eastern, Outer, and Southern Districts Management Plan, the commercial herring fishery in these areas will remain closed during 2005. Monitoring of the Southern District herring stocks will occur as in the past through the use of aerial surveys, possibly in conjunction with test fish sampling conducted on an opportunistic basis.

## **2004 ALASKA BOARD OF FISHERIES MEETING**

### **REGULATORY ACTIONS**

The Alaska Board of Fisheries (BOF) met between November 11 and 13, 2004, in Anchorage to consider changes to existing regulations governing LCI subsistence, commercial, and sport salmon and herring fisheries. Only three proposals were submitted for commercial salmon fishing in the LCI area, while none were proposed for commercial herring fishing or for subsistence salmon fishing. Members of the general public submitted all proposals. A brief summary, including the nature of the proposals, authors, and BOF resultant action on each, appears in Table 11.

The first proposal (#13), submitted by the Seldovia Advisory Committee, sought to amend the weekly fishing periods for set gillnetting in Halibut Cove Subdistrict of the Southern District. As worded, the proposal would allow set gillnetters in that subdistrict to fish on the same schedule as seiners, beginning whenever waters of Halibut Cove Subdistrict opened to commercial seine fishing. Under present regulations and management, set netters in Halibut Cove Subdistrict begin fishing on the first Monday in June on a schedule of two 48-hour periods per week, while seiners traditionally begin fishing between June 16 and 26 on a schedule of five days per week. Weekly fishing periods for set gillnetters are normally liberalized to five days per week after the 4<sup>th</sup> of July holiday. During discussions, the BOF felt an increased harvest of Chinook salmon destined for a stocking site in Halibut Cove Lagoon, primarily to benefit recreational fishermen, was inappropriate for the commercial gear group since the Chinooks were already fully utilized. As a result, Proposal #13 failed unanimously.

The second commercial salmon fishing proposal (#14) sought to change the opening date for set gillnet fishing in the Southern District, from the first Monday in June to a set calendar date of June 1. Submitted by the Kachemak Bay Salmon Producers marketing cooperative, the proposal generated significant discussion by the BOF, and a number of additional alternatives to the proposed date of June 1 were considered. Since three Chinook salmon enhancement programs, meant to primarily benefit recreational users, occur in the Southern District, the BOF was concerned about the potential increase in the catch of this species by commercial set gillnetters. After lengthy debate, which at times showed the potential to prolong the proceedings, the BOF accepted a compromise offered by ADF&G staff. Using the BOF's intent garnered during the discussions on this proposal, the Department was directed to open



the Southern District commercial set gillnet fishery by emergency order in an allocatively neutral manner on or after June 1.

The final proposal dealing with the commercial salmon fishery (#15) was a request by Cook Inlet Aquaculture Association (CIAA) to modify the Bear Lake Sockeye Salmon Management Plan. In an effort to provide the organization with an equitable portion of the Bear Lake enhanced sockeye salmon return, for use as cost recovery to defray operational expenses, CIAA proposed that the harvestable surplus of sockeyes be managed to provide an equal share for CIAA and the commercial seine fishery. After hearing the history of the Bear Lake sockeye project, in particular CIAA's difficulty in achieving adequate revenue objectives, and also listening to support from the seine fleet, the BOF unanimously approved the proposal. CIAA's projection of increased adult returns, based on elevated stocking levels, and resultant seine harvests exceeding historical levels, influenced the BOF's decision to favor this proposal.

## **LCI ESCAPEMENT GOAL REVIEW**

As part of the standard order of business during each BOF meeting, the Department staff at the November 2004 meeting presented a brief review of LCI salmon escapement goals. The existing goals for all species were adopted at the last BOF meeting in 2001, and the 2004 meeting provided a timely and appropriate forum to present escapement information collected during the subsequent three seasons and make new recommendations, if appropriate.

Under the ADF&G Salmon Escapement Goal Policy, adopted in 1992, escapement goals were categorized as biological escapement goals (BEG's), optimal escapement goals (OEG's), or inriver goals. At that time, all LCI goals were considered BEG's. During 2000 and 2001, the BOF adopted **5 AAC 39.222. POLICY FOR THE MANAGEMENT OF SUSTAINABLE SALMON FISHERIES** and **5 AAC 39.223. POLICY FOR STATEWIDE SALMON ESCAPEMENT GOALS**. Under these new policies, sustainable escapement goals (SEG's) were added to BEG's, OEG's, and inriver goals. BEG's require reliable salmon escapement estimates, as well as total annual returns, whereas SEG's suggest a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a five to 10 year period. The latter is used in situations where a BEG cannot be estimated due to the absence of stock specific catch estimate. Because nearly all LCI escapement estimates are actually indices of abundance rather than estimates of total spawner abundance, the staff determined that SEG's were much more appropriately applied to LCI salmon streams than BEG's, and the BOF formally adopted this as policy in 2001.

A more thorough and detailed discussion of the escapement goal review and analysis is presented in ADF&G Special Publication No. 04-14 (Otis and Hasbrouck, 2004). Using additional escapement data collected during the three years since the existing goals were established, and because escapement performance relative to the recently adopted goals was considered good, the staff ultimately recommended very few changes, none of which was considered substantial. The Department recommended that pink salmon SEG's for the Big and Little Kamishak Rivers in Kamishak Bay District be removed since those stocks receive no directed fishing effort or consistent monitoring. Additionally, the staff recommended that pink salmon escapement goals for Bear and Salmon Creeks, in Resurrection Bay of the Eastern District, be combined because these stocks are managed and assessed as one stock. The BOF unanimously accepted the Department's recommendations.

## **ACKNOWLEDGEMENTS**

### **2004 DIVISION OF COMMERCIAL FISHERIES STAFF**

The finfish operations for the Division of Commercial Fisheries in Lower Cook Inlet employed five permanent full-time employees, eight permanent/seasonal employees, and one non-permanent/seasonal employee in various area management and research programs during the 2004 season. Appreciation is extended to all personnel for a successful program during 2004.

Permanent Employees during the 2004 season:

Lee Hammarstrom	Area Finfish Management Biologist
Mark Dickson	Fish & Wildlife Technician IV
Edward O. "Ted" Otis	LCI Finfish Research Project Leader
Marnee Beverage	Program Technician
Mark Hottmann	Boat Officer III

Seasonal Employees:

Greg Demers	Fish & Wildlife Technician III
Carla Armstrong	Fish & Wildlife Technician III
Robert "Bo" Fusco	Fish & Wildlife Technician III
Sigfus T. "Tom" Sigurdsson	Fish & Wildlife Technician II
Colby Sander	Fish & Wildlife Technician II
Del Masterhan	Vessel Technician II
Peter Vanstory	Vessel Technician II
Josh Mumm	Boat Officer I
Carolyn Bunker	Administrative Clerk II

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## **TABLES AND FIGURES**

**Table 1.**—Commercial, hatchery, and derby salmon catches in numbers of fish by species, district, and gear type, Lower Cook Inlet, 2004.

<i>District</i>		Chinook	Sockeye	Coho	Pink	Chum	Total
<b>Gear Type</b>							
<b><i>Southern</i></b>							
Commercial:							
Set gillnet <sup>a</sup>	1,402	16,125	1,174	843	1,238	20,782	
Purse seine	256	21,621	267	2,273	138	24,555	
Hatchery:							
Purse seine		12,991		2,458,843		2,471,834	
<b>Total</b>	<b>1,658</b>	<b>50,737</b>	<b>1,441</b>	<b>2,461,959</b>	<b>1,376</b>	<b>2,517,171</b>	
<b><i>Outer</i></b>							
Commercial:							
Purse seine	2	11,082	13	42,636	27,911	81,644	
<b><i>Eastern</i></b>							
Commercial:							
Purse seine	0	16,645	0	0	1	16,646	
Hatchery:							
Weir		0	1,215			1,215	
Derby <sup>b</sup> :							
Hook & Line			4,400			4,400	
<b>Total</b>	<b>0</b>	<b>16,645</b>	<b>5,615</b>	<b>0</b>	<b>1</b>	<b>22,261</b>	
<b><i>Kamishak</i></b>							
Commercial:							
Purse seine	0	35,285	5,367	12,969	177,395	231,016	
Hatchery:							
Purse seine		16,372				16,372	
<b>Total</b>	<b>0</b>	<b>51,657</b>	<b>5,367</b>	<b>12,969</b>	<b>177,395</b>	<b>247,388</b>	
<b>LCI Total</b>	<b>1,660</b>	<b>130,121</b>	<b>12,436</b>	<b>2,517,564</b>	<b>206,683</b>	<b>2,868,464</b>	
Percent	0.06%	4.54%	0.43%	87.77%	7.21%	100.00%	
1984-2003	1,404	283,479	12,212	1,174,242	51,919	1,523,256	

<sup>a</sup> Set gillnet catches in 2004 include a very small number of fish not sold but retained for personal use.

<sup>b</sup> Derby catches are fish entered into the Seward Silver Salmon Derby that are subsequently sold to a commercial processor, therefore these catches are considered part of the LCI “commercial harvest.”

**Table 2.**—Commercial Chinook salmon catches and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Halibut Cove			
Common Property (seine)	18		
Common Property (set gillnet)	865		
<b>Total Catch</b>			883
China Poot Bay (seine)	221		221
Neptune Bay (seine)	17		17
Tutka/Kasitsna Bays (set gillnet)	271		271
Barabara Creek (set gillnet) <sup>b</sup>	22		22
Seldovia Bay (set gillnet)	244		244
<b>SOUTHERN DISTRICT TOTAL</b>	1,658		1,658
<b>OUTER DISTRICT</b>			
East Arm Nuka Bay (McCarty Fiord)	2		2
<b>OUTER DISTRICT TOTAL</b>	2		2
<b>EASTERN DISTRICT TOTAL</b>	0		0
<b>KAMISHAK BAY DISTRICT TOTAL</b>	0		0
<b>TOTAL LOWER COOK INLET</b>	1,660		1,660

<sup>a</sup> Chinook escapement in Lower Cook Inlet is very limited; no escapement surveys are conducted.

<sup>b</sup> Set gillnet catches in 2004 include a very small number of fish not sold but retained for personal use.

**Table 3.**—Commercial sockeye salmon catches (including hatchery cost recovery) and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpy Creek		18	18
Halibut Cove			
Common Property (seine)	880		
Common Property (set gillnet)	1,790		
Total Catch			2,670
China Poot Bay			
Common Property (seine)	13,846		
Hatchery Cost Recovery	4,473		
China Poot Creek		448 <sup>b</sup>	
Total Run			18,767
Neptune Bay			
Common Property (seine)	6,533		
Hatchery Cost Recovery	8,518		
Oxbow Creek		60	
Total Run			15,111
Tutka/Kasitsna Bays			
Common Property (seine)	362		
Common Property (set gillnet)	5,465		
Total Catch			5,827
Barabara Creek	1,362 <sup>c,d</sup>		1,362
Seldovia Bay/River	4,939 <sup>c</sup>	15	4,954
Port Graham/Port Graham River	1,032 <sup>c</sup>	1	1,033
English Bay			
Common Property (set gillnet)	1,537		
English Bay Lakes		15,352 <sup>e</sup>	
Hatchery Broodstock		1,390 <sup>f</sup>	
Total Run			18,279
<b>SOUTHERN DISTRICT TOTAL</b>	50,737	17,284	68,021
<b>OUTER DISTRICT</b>			
East Arm Nuka Bay (McCarty Fiord)	11,073		
Delight Lake		7,262	
Desire Lake		10,700	
Delusion Lake		1,000	
Total Run			30,035
Port Dick			
South Section	7		
North Section	2		
Total Run			9
<b>OUTER DISTRICT TOTAL</b>	11,082	18,962	30,044

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**Table 3.**– Page 2 of 2.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>EASTERN DISTRICT</b>			
Aialik Bay & Aialik Lake		10,100	10,100
Resurrection Bay North			
Common Property (seine)	16,645		
Bear Lake Escapement		8,198 <sup>g</sup>	
Hatchery Broodstock		3,862 <sup>h</sup>	
Bear & Salmon Creeks		3	
Total Run			28,708
<b>EASTERN DISTRICT TOTAL</b>	16,645	22,163	38,808
<b>KAMISHAK BAY DISTRICT</b>			
Iniskin Bay	12		12
Kirschner Lake/Hatchery Cost Rec.	16,372		16,372
Bruin Bay/ Bruin Bay River		400	400
Chenik Lake	33,177		
Amakdedori Creek		7,200	
Chenik Creek/Lake		17,006	
Total Run			57,383
McNeil Cove/Mikfik Lake & Creek		14,020	14,020
Kamishak Bay/ Big Kamishak R.		800	800
Douglas River/Silver Beach	2,096		2,096
<b>KAMISHAK BAY DISTRICT</b>	51,657	39,426	91,083
<b>TOTAL LOWER COOK INLET</b>	130,121	97,835	227,956

<sup>a</sup> Escapement estimates derived from limited aerial surveys. Numbers represent unexpanded aerial live counts.

<sup>b</sup> No freshwater escapement, prevented by barrier falls.

<sup>c</sup> Set gillnet catches in the common property fishery.

<sup>d</sup> Barabara Creek set gillnet catches include a very small number of fish not sold but retained for personal use.

<sup>e</sup> Weir counts for English Bay Lakes includes 14,615 sockeyes actually counted, an estimated 2,127 sockeyes that entered the lake system while the weir was not operational, minus the broodstock harvest of 1,390 fish (taken from lake escapement).

<sup>f</sup> English Bay Lakes sockeye broodstock total includes 1,190 adults actually used for egg take and 200 mortalities.

<sup>g</sup> Weir counts for Bear Lake sockeyes include 11,923 sockeyes actually counted, minus the broodstock harvest of 3,725 fish (taken from lake escapement).

<sup>h</sup> Bear Lake sockeye broodstock total includes 137 mortalities.

**Table 4.**—Commercial coho salmon catches (including hatchery cost recovery and sport derby sold to commercial processors) and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Northshore Subd./Clearwater Slough Halibut Cove		1,100 <sup>a</sup>	1,100
Common Property (seine)	13		
Common Property (set gillnet)	107		
Total Catch			120
China Poot Bay (seine)	174		174
Neptune Bay (seine)	79		79
Tutka/Kasitsna Bays			
Common Property (seine)	1		
Common Property (set gillnet)	820		
Total Catch			821
Barabara Creek (set gillnet) <sup>b</sup>	170		170
Seldovia Bay (set gillnet)	66		66
Port Graham (set gillnet)	8		8
English Bay (set gillnet)	3		3
<b>SOUTHERN DISTRICT TOTAL</b>	1,441	1,100	2,541
<b>OUTER DISTRICT</b>			
Port Dick			
South Section	1		
North Section	12		
Total Catch			13
<b>OUTER DISTRICT TOTAL</b>	13		13
<b>EASTERN DISTRICT</b>			
Resurrection Bay North			
Hatchery Harvest (donated)	1,215		
Sport Derby	4,400		
Bear Lake (weir counts)		572	
Hatchery Broodstock		862	
Total Run			7,049
<b>EASTERN DISTRICT TOTAL</b>	5,615	1,434	7,049
<b>KAMISHAK BAY DISTRICT</b>			
Douglas River	5,202		5,202
Cottonwood/Iliamna Bays	149		149
Iniskin Bay	16		16
<b>KAMISHAK BAY DISTRICT TOTAL</b>	5,367		5,367
<b>TOTAL LOWER COOK INLET</b>	12,436	2,534	14,970

<sup>a</sup> Coho escapement estimates in Lower Cook Inlet are very limited; 1 escapement survey was conducted during 2004, escapement figure represents unexpanded peak aerial live count.

<sup>b</sup> Barabara Creek set gillnet catches include a very small number of fish not sold but retained for personal use.

**Table 5.**—Commercial pink salmon catches (including hatchery cost recovery) and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpty Creek		28,945	28,945
Halibut Cove (seine)	9		9
China Poot Bay/Creek (seine)	247	3,335	3,582
Neptune Bay (seine)	1,241		1,241
Tutka/Kasitsna Bays			
Common Property (seine)	776		
Common Property (set gillnet)	747		
Hatchery Cost Recovery	1,175,326		
Tutka Lagoon Creek		17,846	
Total Run			1,194,695
Barabara Creek (set gillnet) <sup>b</sup>	9	5,395	5,404
Seldovia Bay & River (set gillnet)	87	56,763	56,850
Port Graham			
Hatchery Cost Recovery	1,283,517		
Port Graham River		44,010	
Duncan Slough		5,000 <sup>c</sup>	
Hatchery Broodstock		69,542	
Total Run			1,402,069
<b>SOUTHERN DISTRICT TOTAL</b>	2,461,959	230,836	2,692,795
<b>OUTER DISTRICT</b>			
Dogfish Bay		3,219	3,219
Port Chatham		26,375	26,375
Chugach Bay		191	191
Windy Bay			
Windy Right Creek		11,974	
Windy Left Creek		23,286	
Total Run			35,260
Rocky Bay			
Scurvy Creek		817	
Rocky River		53,760	
Total Run			54,577
Port Dick			
South Section	13,271		
North Section	28,286		
Port Dick (head end) Creek		13,323	
Slide Creek		7,084	
Middle Creek		7,486	
Island Creek		33,573	
Taylor Bay Creeks		6,151	
Total Run			109,174

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**Table 5.**—Page 2 of 2.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>OUTER DISTRICT</b> (cont'd)			
Nuka Island/ S. Nuka Island Creek		6,432	6,432
East Arm Nuka Bay (McCarty Fiord)	1,079		
Delight Lake		400	
Desire Lake		24,258	
Delusion Lake		275	
Total Run			26,012
<b>OUTER DISTRICT TOTAL</b>	42,636	218,604	261,240
<b>EASTERN DISTRICT</b>			
Resurrection Bay North			
Bear/Salmon Creeks		1,236	
Clear Creek		18	
Sawmill Creek		198	
Spring Creek		268	
Tonsina Creek		3,450	
Humpy Cove		990	
Thumb Cove (Likes Creek)		4,250	
Total Run			10,410
<b>EASTERN DISTRICT TOTAL</b>	0	10,410	10,410
<b>KAMISHAK BAY DISTRICT</b>			
Inisksin Bay	2,268		
North Head Creek		6,849	
Sugarloaf Creek		1,900	
Total Run			11,017
Cottonwood/Iliamna Bays	4,178		4,178
Ursus Cove			
Ursus Head Creek		5,000	
Brown's Peak Creek		18,100	
Ursus Lagoon Creek		123	
Total Run			23,223
Rocky Cove/Sunday Creek	4,500	31,497	35,997
Bruin Bay/Bruin Bay River	1,453	66,494	67,947
Douglas River	570		570
<b>KAMISHAK BAY DISTRICT</b>	12,969	129,963	142,932
<b>TOTAL LOWER COOK INLET</b>	2,517,564	589,813	3,107,377

<sup>a</sup> Escapement estimates are derived from periodic ground or aerial surveys with stream life factors applied.

<sup>b</sup> Barabara Creek set gillnet catches include a very small number of fish not sold but retained for personal use.

<sup>c</sup> Duncan Slough pink escapement estimated by Port Graham Hatchery personnel.

**Table 6.**—Commercial chum salmon catches and escapements in numbers of fish by subdistrict or section, Lower Cook Inlet, 2004.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpty Creek		1,208	1,208
Halibut Cove			
Common Property (seine)	3		
Common Property (set gillnet)	79		
Total Catch			82
China Poot Bay (seine)	46		46
Neptune Bay (seine)	81		81
Tutka Bay			
Common Property (seine)	8		
Common Property (set gillnet)	718		
Tutka Creek		2	
Total Catch			728
Barabara Creek	140 <sup>b,c</sup>		140
Seldovia Bay & River	92 <sup>b</sup>	2,519	2,611
Port Graham/Port Graham River	136 <sup>b</sup>	1,177	1,313
English Bay	73 <sup>b</sup>		73
<b>SOUTHERN DISTRICT TOTAL</b>	1,376	4,906	6,282
<b>OUTER DISTRICT</b>			
Dogfish Bay		3,617	3,617
Port Chatham		817	817
Windy Bay			
Windy Right Creek		788	
Windy Left Creek		992	
Total Run			1,780
Rocky Bay & River		17,159	17,159
Port Dick			
South Section	6,852		
North Section	20,917		
Port Dick (head end) Creek		8,620	
Slide Creek		7,303	
Middle Creek		1,574	
Island Creek		15,135	
Total Run			60,401
Nuka Island/Petrof River		5,767	5,767
East Nuka Bay	142		142
<b>OUTER DISTRICT TOTAL</b>	27,911	61,772	89,683

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**Table 6.**—Page 2 of 2.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>EASTERN DISTRICT</b>			
Resurrection Bay North (seine)	1		
Sawmill Creek		19	
Spring Creek		191	
Thumb Cove		195	
Tonsina Creek		1,404	
Total Run			1,810
<b>EASTERN DISTRICT TOTAL</b>	1	1,809	1,810
<b>KAMISHAK BAY DISTRICT</b>			
Iniskin Bay	8,651		
Iniskin River		22,044	
Sugarloaf Creek		2,338	
Portage Creek		3,429	
North Head Creek		6,994	
Total Run			43,456
Cottonwood Bay & Creek	153,236	16,277	169,513
Ursus Cove			
Brown's Peak Creek		2,509	
Ursus Lagoon Right Creek		9,412	
Ursus Cove Lagoon Creek		6,576	
Ursus Head Creek		600	
Total Run			19,097
Rocky Cove/Sunday Creek	1,800	5,357	7,157
Bruin Bay & River	7,022	15,886	22,908
Chenik Lake/Amakdedori Creek		25	25
McNeil River		11,203	11,203
Kamishak River/Reef			
Big Kamishak River		57,897	
Little Kamishak River		45,342	
Strike Creek		9,180	
Total Run			112,419
Douglas River/Silver Beach	6,686		
Douglas Beach Creek		3,277	
Total Run			9,963
<b>KAMISHAK BAY DISTRICT TOTAL</b>	177,395	218,346	395,741
<b>TOTAL LOWER COOK INLET</b>	206,683	286,833	493,516

<sup>a</sup> Escapement estimates are derived from periodic ground or aerial surveys with stream life factors applied.

<sup>b</sup> Set gillnet catches in the common property fishery.

<sup>c</sup> Barabara Creek set gillnet catches include a very small number of fish not sold but retained for personal use.

**Table 7.**—Exvessel value of the commercial salmon catch in numbers of dollars by species, gear type, and harvest type, Lower Cook Inlet, 2004.

	Chinook	Sockeye	Coho	Pink	Chum	Total
COMMON PROPERTY – PURSE SEINE						
No. of Fish	258	84,633	5,647	57,878	205,445	353,861
Pounds	1,904	417,908	40,135	207,207	1,684,414	2,351,568
Price/lb.	\$0.33	\$0.80	\$0.44	\$0.05	\$0.20	
Value	\$628	\$334,326	\$17,659	\$10,360	\$336,883	\$699,856
COMMON PROPERTY – SET GILLNET <sup>a</sup>						
No. of Fish	1,402	16,125	1,174	843	1,238	20,782
Pounds	18,707	93,382	8,511	2,784	9,061	132,445
Price/lb.	\$1.68	\$1.16	\$0.52	\$0.07	\$0.21	
Value	\$31,371	\$108,035	\$4,391	\$192	\$1,898	\$145,887
HATCHERY – PURSE SEINE & WEIR						
No. of Fish		29,363	1,215	2,458,843		2,489,421
Pounds		138,080	9,432	8,546,783		8,694,295
Price/lb.		\$0.44	\$0.00 <sup>b</sup>	\$0.04		
Value		\$60,755	\$0 <sup>b</sup>	\$341,874		\$402,629
SPORT FISHING DERBY <sup>c</sup> – HOOK & LINE						
No. of Fish			4,400			4,400
Pounds			35,999			35,999
Price/lb.			\$0.50			
Value			\$18,000			\$18,000
TOTAL ALL GEARS						
No. of Fish	1,660	130,121	12,436	2,517,564	206,683	2,868,464
Pounds	20,611	649,370	94,077	8,756,774	1,693,475	11,214,307
Price/lb.	\$1.55	\$0.77	\$0.47 <sup>b</sup>	\$0.04	\$0.20	
Value	\$31,992	\$503,116	\$40,050 <sup>b</sup>	\$352,426	\$338,781	\$1,266,365

*Note:* Exvessel value is calculated from average prices, which are determined only by fish ticket information and may not reflect retroactive or postseason adjustments.

<sup>a</sup> 2004 set gillnet totals include a very small number of fish not sold but retained for personal use.

<sup>b</sup> Average price per pound and value for hatchery cost recovery coho reflect only those fish actually sold and do not include hatchery fish that were donated.

<sup>c</sup> Fish entered into the Seward Silver Salmon Derby are subsequently sold to a commercial processor and are therefore considered “commercial harvest.”

**Table 7.**—Emergency orders issued for the commercial, personal use, and subsistence salmon fisheries in Lower Cook Inlet, 2004.

Number/ Issue Date	DESCRIPTION
2-F-H-001-04 May 12	<p>Opens those waters of Resurrection Bay in the Eastern District enclosed by a line from Aialik Cape south to a point one mile due south of Aialik Cape, then northeast to a point one mile due south of Cape Resurrection, then north to Cape Resurrection, to commercial salmon seining on a weekly schedule of two 40-hour periods per week, from Monday 6:00 a.m. until Tuesday 10:00 p.m. and Thursday 6:00 a.m. until Friday 10:00 p.m., effective Monday, May 17, 2004, until further notice. All waters along the west shore of Resurrection Bay west of a line from the old military dock pilings north of Caines Head to a regulatory marker near the Seward Airport will remain closed to seining.</p> <p>In addition, this emergency order designates and establishes a Special Harvest Area (SHA) for Cook Inlet Aquaculture Association (CIAA) in Resurrection Bay North Subdistrict of the Lower Cook Inlet (LCI) management area. The SHA includes those fresh waters of Bear Creek, Salmon Creek, and Resurrection River downstream of, and including, the Bear Creek weir. This emergency order opens waters of the Resurrection Bay SHA in the Eastern District to the harvest and sale of salmon seven days per week by authorized agents of CIAA effective at 6:00 a.m. Monday, May 17, 2004, until further notice.</p>
2-F-H-002-04 May 27	<p>Establishes a seven-day-per-week fishing schedule in the Kamishak Bay District commercial salmon seine fishery, which opens by regulation on June 1, 2004. Waters of Chenik Subdistrict within the Kamishak Bay District will remain closed to commercial salmon seining until further notice based on the provisions of this emergency order.</p> <p>This emergency order also closes the Port Graham Subdistrict, including both the Port Graham and English Bay Sections, in the Southern District to commercial salmon set gillnet fishing until further notice. In addition, this emergency order opens Halibut Cove, Tutka Bay, Barabara Creek, and Seldovia Bay Subdistricts in the Southern District to commercial salmon set gillnet fishing effective at 6:00 a.m. Tuesday, June 1, 2004.</p>
2-F-H-003-04 June 14	<p>Closes waters of Resurrection Bay in the Eastern District to commercial salmon seining effective at 10:00 p.m. Tuesday, June 15, 2004, until further notice.</p>
2-F-H-004-04 June 18	<p>Designates and establishes Special Harvest Areas (SHA's) for Cook Inlet Aquaculture Association (CIAA) in China Poot and Bruin Bay Subdistricts of the Lower Cook Inlet (LCI) management area. It also designates and establishes an English Bay SHA for the Port Graham Hatchery Corporation (PGHC) in the English Bay Section of Port Graham Subdistrict, located in the Southern District of the LCI management area. This emergency order closes the Kirschner Lake SHA to the common property salmon seine fishery, while concurrently opening</p>

-continued-



**Table 8.**—Page 2 of 7.

Number/ Issue Date	DESCRIPTION
2-F-H-004-04 June 18 (continued)	<p>waters of the Kirschner Lake SHA in the Kamishak Bay District, and the China Poot and Hazel Lake SHA's in the Southern District, to the harvest of salmon seven days per week by authorized agents of CIAA effective at 6:00 a.m. Monday, June 21, 2004, until further notice. The English Bay SHA is not being opened to hatchery fishing at this time.</p> <p>This emergency order also opens portions of the China Poot, Tutka Bay, and Halibut Cove Subdistricts, all within the Southern District, to commercial salmon seining five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., effective 6:00 a.m. Monday, June 21, 2004, until further notice. In the China Poot Subdistrict, commercial seining shall be allowed five days per week only in those waters outside (offshore) of a line beginning at a marker on the west shore of Neptune Bay at approximately 59° 32.83' N. latitude, 151° 24.95' W. longitude, then to Lancashire Rock, then to the navigational light on Gull Island, then to Moosehead Point, effective June 21. In the Halibut Cove Subdistrict, seining shall be allowed only in waters outside of Halibut Cove Lagoon beginning June 21 on a five-days-per-week basis; waters within Halibut Cove Lagoon will remain closed to commercial fishing. In the Tutka Bay Subdistrict, commercial seining is restricted to those waters seaward of a line extending from the "rock quarry" on the north side of the bay at approximately 59° 30.23' N. latitude, 151° 28.23' W. longitude, to the Tutka Bay Lodge on the south side of the bay at approximately 59° 28.45' N. latitude, 151° 28.81' W. longitude, five days per week, effective 6:00 a.m. Monday, June 21, 2004.</p> <p>This emergency order also repeals the regulatory closed waters markers near the HEA power lines in China Poot Bay, and establishes temporary closed waters at the head of China Poot Bay to provide a Dungeness crab sanctuary.</p>
2-F-H-005-04 June 18	<p>Designates and establishes a Special Harvest Area (SHA) for the Cook Inlet Aquaculture Association (CIAA) in Tutka Bay Subdistrict within the Southern District of Lower Cook Inlet. The Tutka Bay SHA consists of all marine waters of Tutka Bay Subdistrict southeast of the Homer Electric Association powerline crossing, including waters of Tutka Lagoon. This emergency order also opens the Tutka Bay SHA to the harvest and sale of salmon seven days per week by authorized agents of CIAA, effective at 6:00 a.m. Monday, June 21, 2004, until further notice. Revenue obtained from the sale of these fish will be used for recovery of operational expenses associated with the Tutka Lagoon Hatchery salmon enhancement programs in Lower Cook Inlet.</p> <p>The commercial purse seine fishery in the Tutka Bay Subdistrict is currently restricted to those waters seaward of a line extending from the "rock quarry" on the north side of Tutka Bay at approximately 59° 30.23' N. latitude, 151° 28.23' W. longitude, to the Tutka Bay Lodge on the south side of the bay at</p>

-continued-

**Table 8.**—Page 3 of 7.

Number/ Issue Date	DESCRIPTION
2-F-H-005-04 June 18 (continued)	<p>approximately 59° 28.45' N. latitude, 151° 28.81' W. longitude, on a five-day-per-week basis (see <i>LCI Emergency Order #2-F-H-004-04</i>). Waters of Tutka Bay between the HEA power lines and the above-described line remain closed to all seine fishing.</p> <p>In addition, this emergency order designates and establishes a SHA for the Port Graham Hatchery Corporation (PGHC) in the Port Graham Subdistrict within the Southern District of Lower Cook Inlet. The Port Graham SHA consists of all marine waters of the Port Graham Subdistrict east of 151° 53.08' W. longitude, and south and west of a line from the southernmost tip of Passage Island to the Coast Guard navigational buoy at approximately 59° 21.45' N. latitude, 151° 50.05' W. longitude, then southeast to a point on the mainland at approximately 59° 20.83' N. latitude, 151° 48.53' W. longitude. This area is located along the south shore of Port Graham from Passage Island to (and including) Duncan Slough. No fishing periods for the Port Graham SHA are being established at this time.</p>
2-F-H-006-04 June 22	Closes waters of McNeil River and Paint River Subdistricts in the Kamishak Bay District to commercial salmon seining effective at 6:00 a.m. Wednesday, June 23, 2004, until further notice.
2-F-H-007-04 June 25	<p>Opens those waters of East Nuka Subdistrict in the Outer District north of the latitude of the entrance to James Lagoon at approximately 59° 33.50' N. latitude to commercial salmon seining five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., effective at 6:00 a.m. Monday, June 28, 2004, until further notice. The closed waters markers at the mouth of Desire Lake Creek WILL NOT BE in effect for this opening, and fishing will be allowed up to the stream mouth. Waters of East Nuka Subdistrict south of the latitude of James Lagoon remain closed to commercial salmon fishing, therefore fishing is prohibited in the vicinity of Delight Lake Creek. Fishing is also prohibited north of the regulatory markers near the former Parks Service tent camp in East Nuka Bay.</p> <p>This emergency order also opens waters of Chenik Subdistrict in the Kamishak Bay District to commercial salmon seining five days per week, from 6:00 a.m. Monday until 6:00 a.m. Saturday, effective at 6:00 a.m. Monday, June 28, 2004, until further notice. Regulatory markers near the mouth of Chenik Creek remain in effect for this opening, and fishing is therefore prohibited in waters of Chenik Lagoon. Additionally, although no markers are in place at Amakdedori Creek, fishing is prohibited within 500 yards of the terminus of the creek by regulation.</p>
2-F-H-008-04 June 30	Opens waters of Port Graham Subdistrict, including both the Port Graham and English Bay Sections, to commercial salmon set gillnet fishing, on the regular

-continued-

Table 8.—Page 4 of 7.

Number/ Issue Date	DESCRIPTION
2-F-H-008-04 June 30 (continued)	<p>schedule of two 48-hour weekly fishing periods, from 6:00 a.m. Monday until 6:00 a.m. Wednesday and from 6:00 a.m. Thursday until 6:00 a.m. Saturday, effective at 6:00 a.m. Thursday, July 1, 2004, until further notice. In addition, this emergency order extends fishing time for commercial set gillnet fishing in Halibut Cove Subdistrict of the Southern District to five days per week, from 6:00 a.m. Monday until 6:00 a.m. Saturday, effective at 6:00 a.m. Monday, July 5, 2004, until further notice.</p> <p>This emergency order also restricts commercial salmon seining in Tutka Bay Subdistrict within the Southern District to those waters seaward (northwest) of a line beginning at the “rock quarry” on the north side of the bay at approximately 59° 30.23' N. latitude, 151° 28.23' W. longitude, to a point on the west shore of the entrance to Little Tutka Bay at approximately 59° 28.63' N. latitude, 151° 30.37' W. longitude, effective at 6:00 a.m. Monday, July 5, 2004, until further notice. The weekly fishing period for purse seining in waters of Tutka Bay Subdistrict, already established at five days per week (see <i>LCI Emergency Order #2-F-H-004-04</i>), is not altered and remains the same.</p>
2-F-H-009-04 July 2	<p>Opens the English Bay Special Harvest Area (SHA) to the harvest of salmon seven days per week by authorized agents of Port Graham Hatchery Corporation (PGHC) effective at 6:00 a.m. Saturday, July 3, 2004, until further notice. In the Southern District, the English Bay SHA consists of all waters of English Bay River beginning at (and including) the adult sockeye salmon counting weir site operated by Chugach Regional Resources Commission (CRRC) to a point approximately 300 yards downstream of this site. The English Bay SHA is defined as those waters of English Bay River between 59° 20.53' N. latitude and 59° 20.88' N. latitude (see <i>LCI Emergency Order #2-F-H-004-04</i>). Revenue obtained from the sale of these fish will help defray the cost of operational expenses associated with the English Bay Lakes sockeye salmon enhancement program.</p>
2-F-H-010-04 July 2	<p>Opens all waters of East Nuka Subdistrict in the Outer District to commercial salmon seining five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., effective at 6:00 a.m. Monday, July 5, 2004, until further notice. The closed waters markers at the mouth of Desire Lake Creek <b>ARE NOT</b> in effect for this opening, and fishing is allowed up to the stream mouth at Desire Lake Creek. However, markers near Delight Lake Creek <b>REMAIN IN EFFECT</b> for this opening, therefore fishing is <b>PROHIBITED</b> in waters of McCarty Lagoon. Fishing also remains prohibited north of the regulatory markers near the former Parks Service tent camp.</p>

-continued-

**Table 8.**—Page 5 of 7.

Number/ Issue Date	DESCRIPTION
2-F-H-011-04 July 4	Closes waters of Chenik Subdistrict in the Kamishak Bay District to commercial salmon seining effective at 6:00 a.m. Monday, July 5, 2004, until further notice.
2-F-H-012-04 July 12	Reopens waters of Chenik Subdistrict in the Kamishak Bay District to commercial salmon seining five days per week, from 6:00 a.m. Monday until 6:00 a.m. Saturday, effective at 12:00 noon Tuesday, July 13, 2004, until further notice.
2-F-H-013-04 July 14	Repeals the regulatory closed waters markers near the mouth of Delight Lake Creek in East Nuka Subdistrict of the Outer District, effective at 6:00 a.m. Thursday, July 15, 2004, until further notice. As a result, commercial salmon seine fishing will be allowed up to the stream mouth at Delight Lake Creek and inside waters of McCarty Lagoon during open commercial fishing periods (see <i><b>LCI Emergency Orders #2-F-H-007-</b></i> and <i><b>-010-04</b></i> ) beginning July 15. Commercial salmon fishing is still prohibited inside the freshwater lagoon at Delight Lake Creek and in waters north of regulatory markers near the former Parks Service tent camp in East Nuka Bay. The weekly fishing period in waters of East Nuka Bay remains unchanged at five days per week.
2-F-H-014-04 July 16	Opens waters of the South, Outer, and Taylor Bay Sections of Port Dick Subdistrict, or statistical reporting areas 232-06, 232-07, and 232-08, in the Outer District, to commercial salmon seining on a schedule of two 40-hour periods per week, from 6:00 a.m. Monday until 10:00 p.m. Tuesday and from 6:00 a.m. Thursday until 10:00 p.m. Friday, effective at 6:00 a.m. Monday, July 19, 2004, until further notice. All normal regulatory markers and closed waters, including those in Taylor Bay, Tacoma Cove, and Sunday Harbor, will be in effect for this opening. Additionally, waters of the North Section of Port Dick Subdistrict, or statistical reporting area 232-09, will remain closed to fishing.
2-F-H-015-04 July 19	Repeals the commercial fishing regulatory closed waters markers near the mouth of Chenik Lake Creek in Chenik Subdistrict of the Kamishak Bay District, effective at 12:00 a.m. Tuesday, July 20, 2004. Based on provisions of this emergency order, commercial salmon seine fishing will be allowed in all waters of Chenik Subdistrict, including those of Chenik Lagoon, seven days per week beginning July 20 until further notice.
2-F-H-016-04 July 20	Closes those waters of East Nuka Subdistrict in the Outer District south of the latitude of the entrance to James Lagoon at approximately 59° 33.50' N. latitude to commercial salmon seining effective at 12:00 noon Wednesday, July 21, 2004, until further notice. Based on the provisions of this emergency

-continued-

**Table 8.**—Page 6 of 7.

Number/ Issue Date	DESCRIPTION
2-F-H-016-04 July 20 (continued)	<p>order, commercial salmon seining is prohibited in marine waters around the mouth of Delight Lake Creek and in waters of McCarty Lagoon in East Nuka Bay beginning at noon on July 21.</p> <p>In addition, this emergency order opens waters of Windy Bay Subdistrict to commercial salmon seining on a schedule of two 40-hour periods per week, from 6:00 a.m. Monday until 10:00 p.m. Tuesday and from 6:00 a.m. Thursday until 10:00 p.m. Friday, effective at 6:00 a.m. Thursday, July 22, until further notice.</p>
2-F-H-017-04 July 28	<p>Opens those Outer District waters of the North Section of Port Dick Subdistrict, or statistical reporting area 232-09, east of 151° 10' W. longitude, to commercial salmon seining on a schedule of two 40-hour periods per week, from 6:00 a.m. Monday until 10:00 p.m. Tuesday and from 6:00 a.m. Thursday until 10:00 p.m. Friday, effective at 6:00 a.m. Thursday, July 29, 2004, until further notice. Waters of the North Section of Port Dick west of 151° 10' W. longitude remain closed to fishing, therefore fishing is prohibited in the vicinity of Middle Creek and remaining north shore waters. All commercial fishing regulatory markers near Island Creek in the North Section of Port Dick Subdistrict remain in effect during open fishing periods.</p>
2-F-H-018-04 July 30	<p>Opens those waters of the Port Graham Special Harvest Area (see <i>LCI Emergency Order #2-F-H-005-04</i>) east of the longitude of the U.S. Coast Guard navigational buoy at approximately 151° 50.05' W. longitude to the harvest of salmon seven days per week by authorized agents of Port Graham Hatchery Corporation (PGHC), effective at 6:00 a.m. Saturday, July 31, 2004, until further notice. Pink salmon harvested during this opening may be utilized for both hatchery broodstock and hatchery cost recovery.</p>
2-F-H-019-04 August 3	<p>Closes all waters of Port Dick and Windy Bay Subdistricts in the Outer District to commercial salmon seining, effective at 10:00 p.m. Tuesday, August 3, 2004, until further notice. The closure time represents the end of a regularly scheduled weekly fishing period.</p>
2-F-H-020-04 August 11	<p>Repeals the commercial fishing regulatory closed waters markers near the mouths of Sunday Creek in Rocky Cove Subdistrict, Brown's Peak Creek in Ursus Cove Subdistrict, and Iniskin River in Iniskin Subdistrict, all in the Kamishak Bay District, effective at 6:00 a.m. Thursday, August 12, 2004, until further notice. In addition, this emergency order also repeals the commercial fishing regulatory markers at the entrance to Ursus Lagoon in Ursus Cove Subdistrict of the Kamishak Bay District, also effective at 6:00 a.m. Thursday, August 12, 2004, until further notice. Based on the provisions of this emergency order, commercial salmon seining will be allowed up to the</p>

-continued-

**Table 8.**—Page 7 of 7.

Number/ Issue Date	DESCRIPTION
2-F-H-020-04 August 11 (continued)	aforementioned stream mouths as well as inside waters of Ursus Lagoon beginning at 6:00 a.m. Thursday, August 12. The weekly fishing schedule for waters affected by this emergency order remains the same as that in all other waters open to fishing in Kamishak Bay District at seven days per week.
2-F-H-021-04 August 12	Opens all waters of the Port Graham Special Harvest Area (see <i>LCI Emergency Order #2-F-H-005-04</i> ) to the harvest of salmon seven days per week by authorized agents of Port Graham Hatchery Corporation (PGHC), effective at 6:00 a.m. Friday, August 13, 2004, until further notice. Pink salmon harvested during this opening may be utilized for both hatchery broodstock and hatchery cost recovery.
2-F-H-022-04 August 18	Closes the Southern District (Kachemak Bay) personal use set gillnet fishery for coho salmon, effective at 6:00 a.m. Saturday, August 21, for the remainder of the 2004 season.

**Table 9.**—Total return of adult pink salmon to the Tutka Bay Hatchery in the Southern District of Lower Cook Inlet, 2004.

COMMERCIAL HARVEST	
Tutka Bay/Lagoon (stat area 241-16):	
Purse Seine	776
Set Gillnet	747 <sup>a</sup>
Hatchery Cost Recovery	1,175,326
<i>Tutka Commercial Harvest</i>	<i>1,176,849</i>
SPORT HARVEST	
<i>Total Sport Harvest (Tutka Bay and Lagoon)</i>	<i>1,500<sup>b</sup></i>
ESCAPEMENT	
Tutka Creek and Channel	17,846
Tutka Hatchery Broodstock	0 <sup>c</sup>
<i>Total Escapement</i>	<i>17,846</i>
<i>Total Return</i>	<i>1,196,195</i>

<sup>a</sup> Based primarily on run timing, all of the set gillnet pink salmon catch in the Tutka Bay Subdistrict was apportioned to the Tutka Hatchery return.

<sup>b</sup> Figure represents estimated average sport catch of pinks in Tutka Bay from 1990 – 1999.

<sup>c</sup> Because CIAA announced the indefinite suspension of operations at Tutka Hatchery, no broodstock was collected in 2004.

**Table 10.**—Commercial salmon catch (in numbers and pounds of fish) and effort (in numbers of permits fished) by district, Lower Cook Inlet, 2004.

DISTRICT	# Permits Fished	Landings	Chinook		Sockeye		Coho		Pink		Chum	
			Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds
Eastern (231)	10	50	0	0	16,645	92,777	5,615	45,431	0	0	1	11
Outer (232)	9	25	2	47	11,082	66,741	13	100	42,636	155,469	27,911	218,438
Southern (241) <sup>a</sup>	41	407	1,658	20,564	50,737	280,227	1,441	10,363	2,461,959	8,556,660	1,376	10,135
Kamishak Bay (249)	8	48	0	0	51,657	209,625	5,367	38,183	12,969	44,645	177,395	1,464,891
LCI Grand Total	47	531	1,660	20,611	130,121	649,370	12,436	94,077	2,517,564	8,756,774	206,683	1,693,475
Avg. Wt.				12.42		4.99		7.56		3.48		8.19
Avg. Price				\$1.56		\$0.77		\$0.47		\$0.04		\$0.20

<sup>a</sup> Southern District catches in 2004 contain a small number of fish not sold but retained for personal use.



**Table 11.**—Proposed regulatory changes for the Lower Cook Inlet commercial salmon fisheries, and resultant actions taken, at the Alaska Board of Fisheries meeting held in Anchorage, November, 2004.

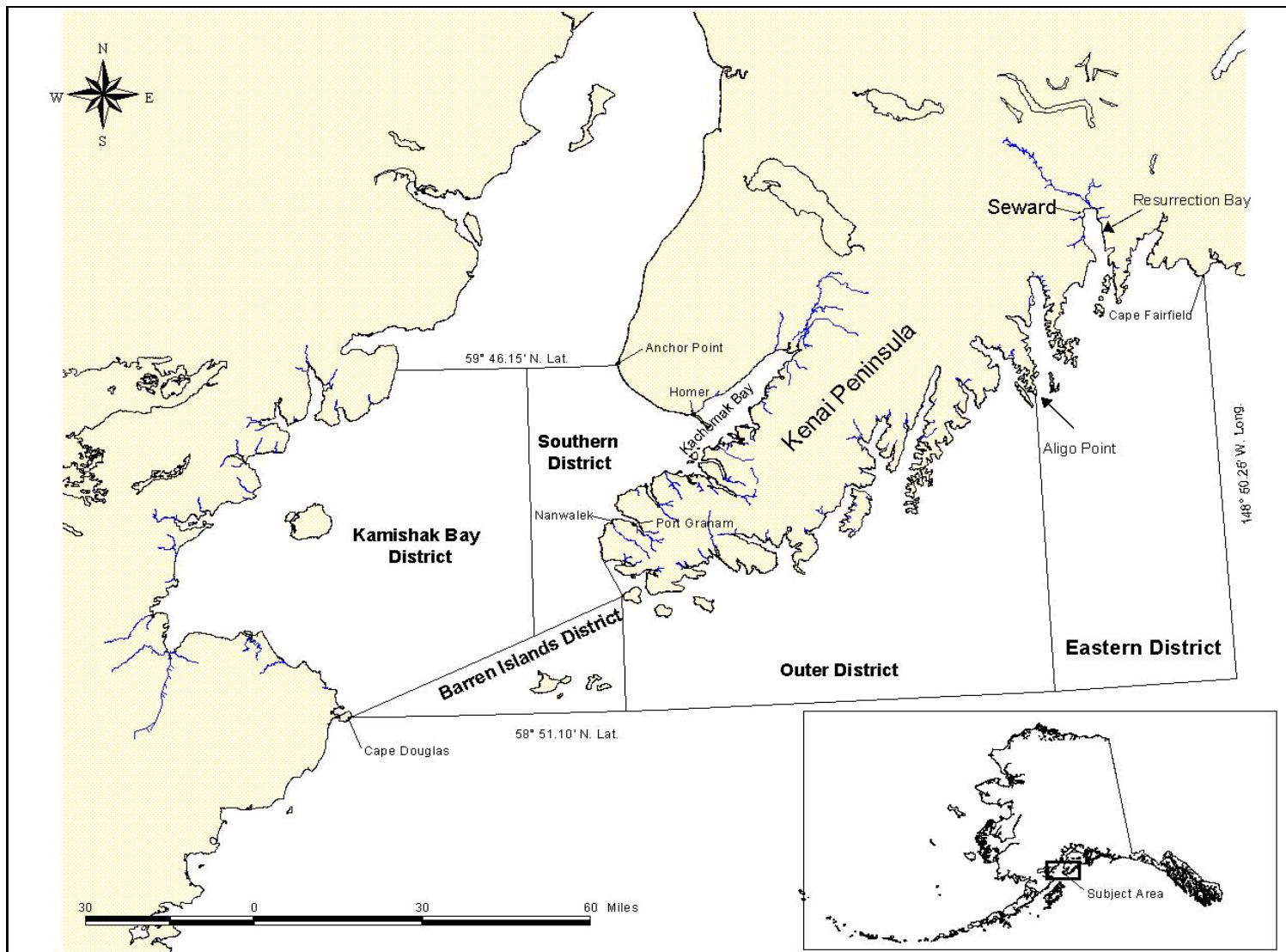
PROPOSAL NUMBER	PROPOSED BY	DESCRIPTION	BOARD ACTION	BOARD VOTE
13	Seldovia Advisory Committee	<b>5 AAC 21.320. (3)</b> Amend weekly fishing periods for set gillnets in Halibut Cove Subdistrict of the Southern District.	Failed (see text)	1 – 6
14	Kachemak Bay Salmon Producers	<b>5 AAC 21.310 (3) (B).</b> Change the opening date for commercial set gillnet salmon fishing in the Southern District.	Amended and adopted (see text)	7 – 0
15	Cook Inlet Aquaculture Association	<b>5 AAC 21.375.</b> Amend the Bear Lake Management Plan to provide for an equal share of the harvestable surplus of sockeyes destined for Bear Lake between CIAA and common property seiners.	Amended and adopted (see text)	7 – 0

*Note:* Proposed regulatory changes adopted by the Alaska Board of Fisheries became effective in February 2005, upon approval of language by the Alaska Dept. of Law and subsequent signing by the Lt. Governor.

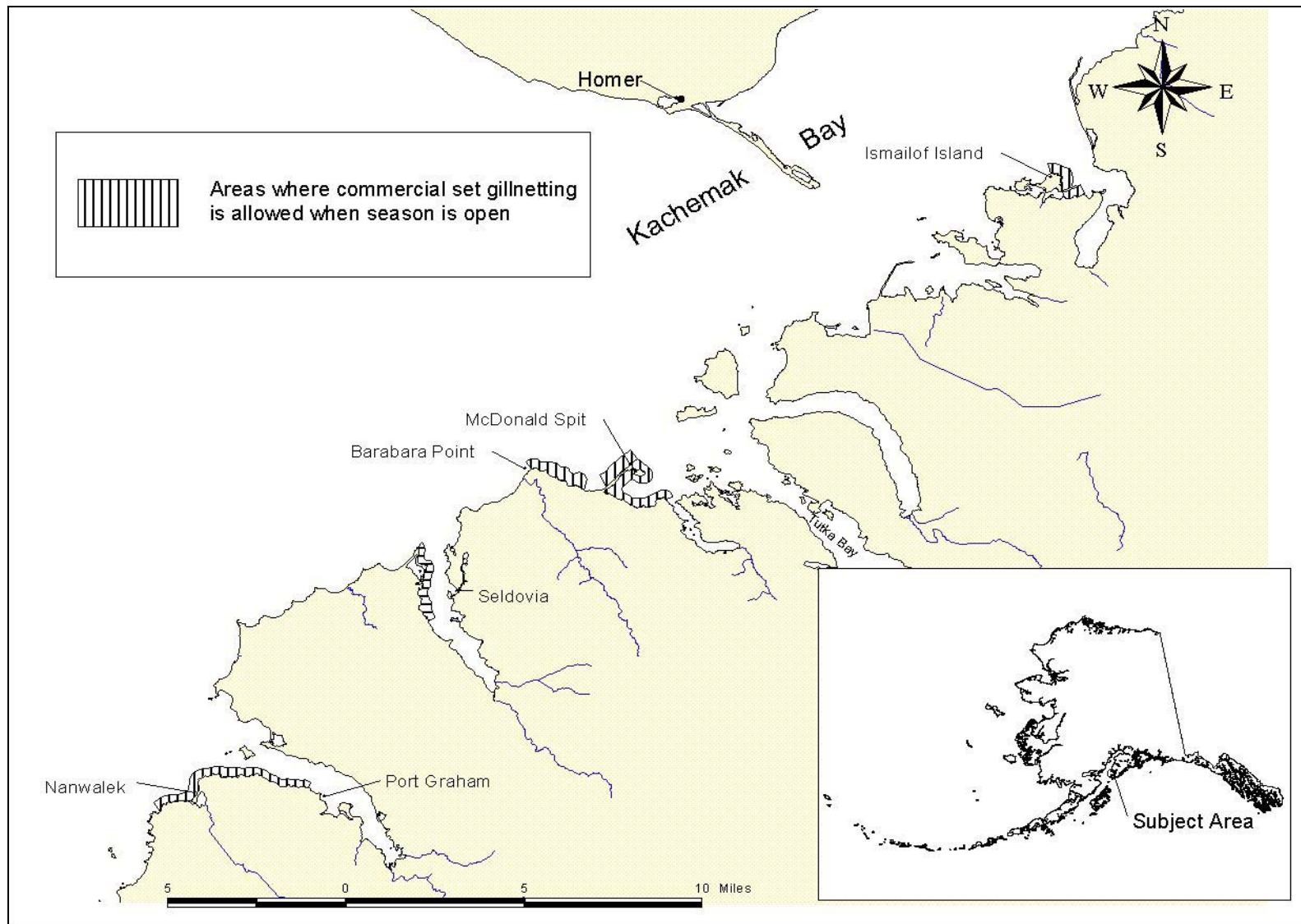
**Table 12.**—Total biomass estimates and commercial catch of Pacific herring *Clupea pallasii* in short tons by age class, Kamishak Bay District, Lower Cook Inlet, 2004, and 2005 forecast.

Age	2004 Est. Spawning Biomass	Percent by Weight	2004 Commercial <sup>a</sup> Harvest	Percent by Weight	2004 Total Biomass	Percent by Weight	2005 Forecast Biomass	Percent by Weight
1								
2								
3	407	16.0	--	--	407	16.0	679	22.2
4	214	8.4	--	--	214	8.4	561	18.3
5	594	23.3	--	--	594	23.3	243	8.0
6	112	4.4	--	--	112	4.4	654	21.4
7	312	12.3	--	--	312	12.3	100	3.3
8	376	14.8	--	--	376	14.8	269	8.8
9	112	4.4	--	--	112	4.4	266	8.7
10	180	7.1	--	--	180	7.1	75	2.5
11	174	6.8	--	--	174	6.8	86	2.8
12	51	2.0	--	--	51	2.0	92	3.0
13+	13	0.5	--	--	13	0.5	32	1.1
TOTALS	2,546	100.0	--	--	2,546	100.0	3,058	100.1

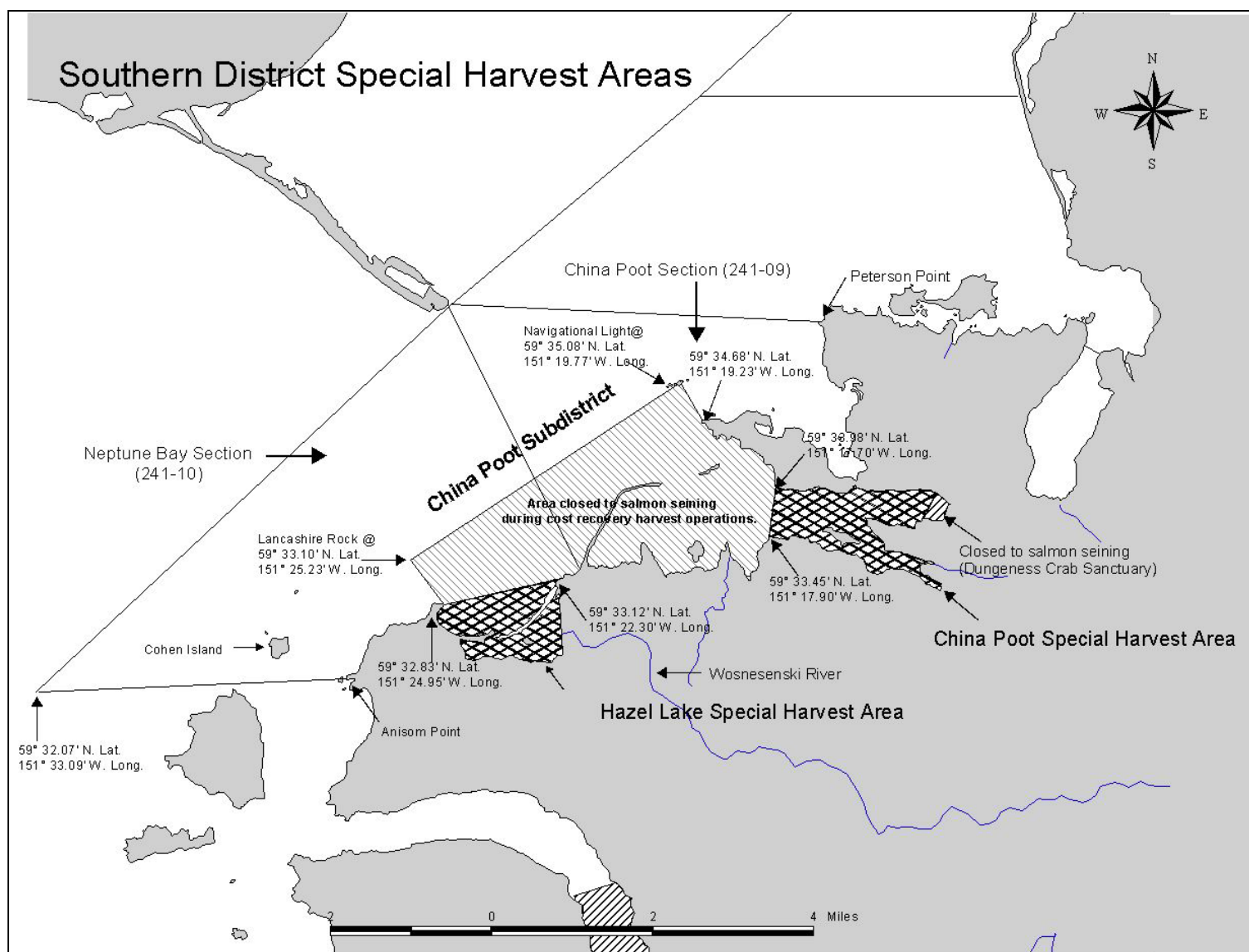
<sup>a</sup> Due to the low forecasted biomass, the commercial herring fishery in Kamishak Bay was not opened in 2004.



**Figure 1.**—Lower Cook Inlet salmon and herring management area.

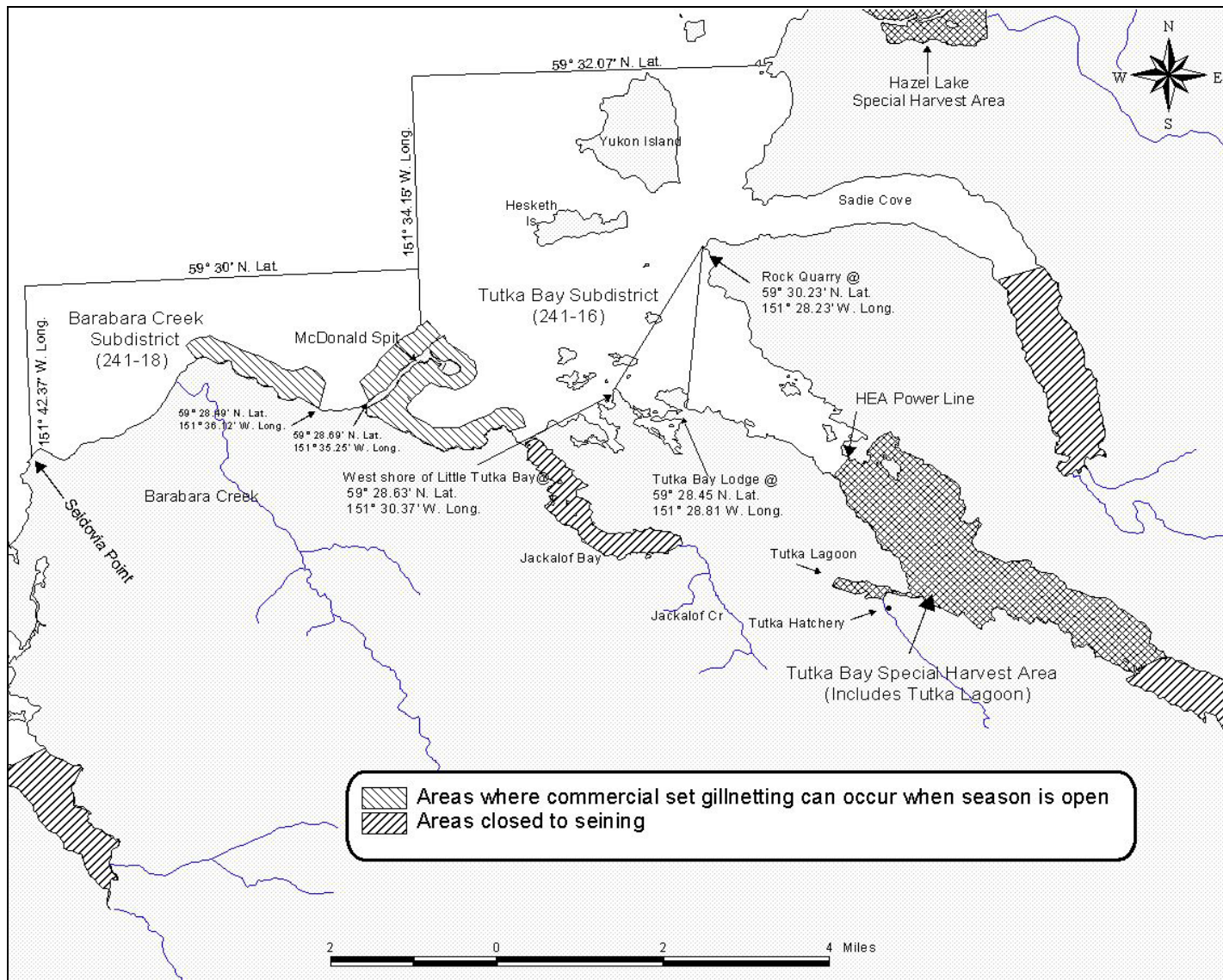


**Figure 2.**—Commercial set gillnet locations in the Southern District of Lower Cook Inlet.

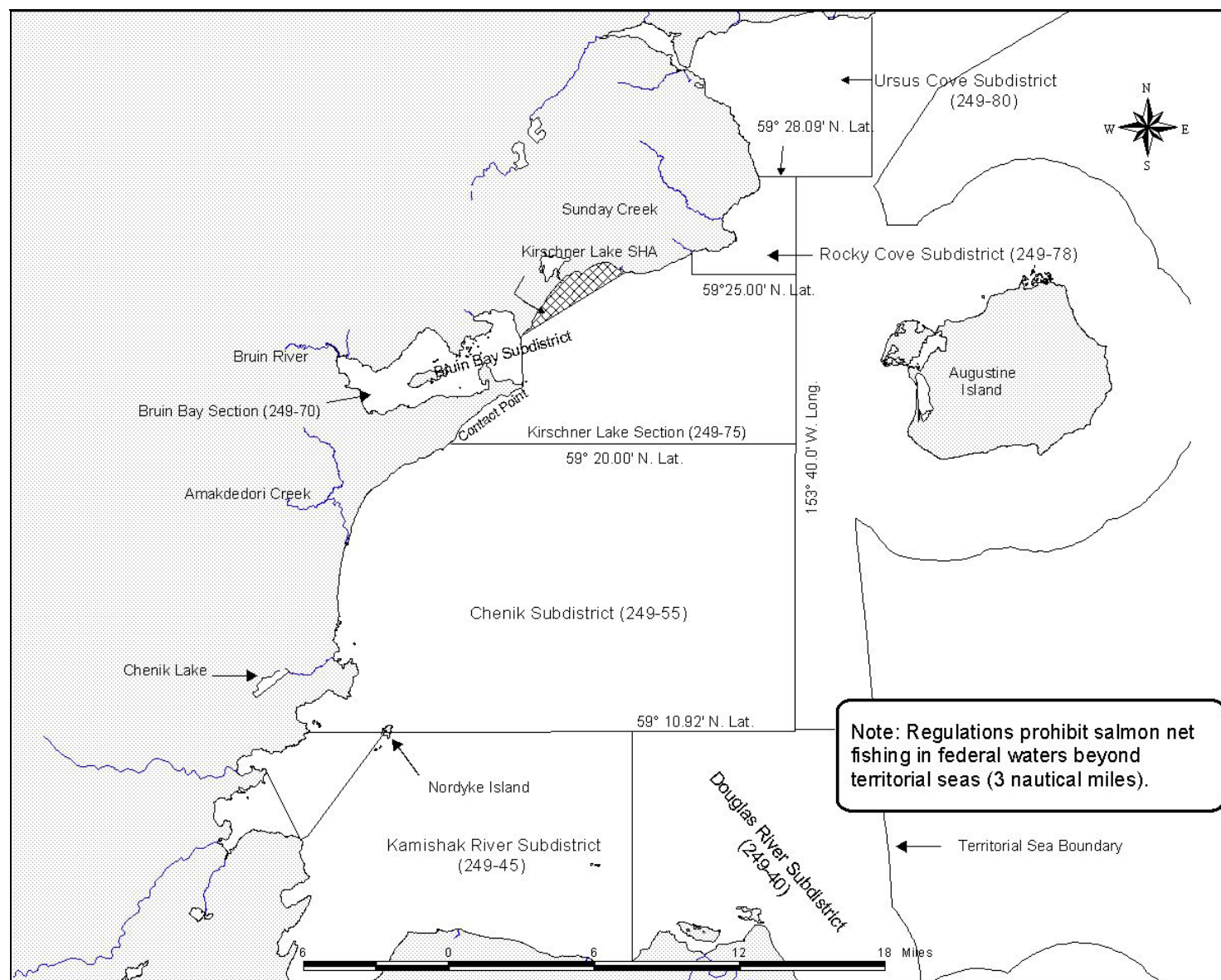


**Figure 3.**—China Poot and Hazel Lake Special Harvest Areas for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.

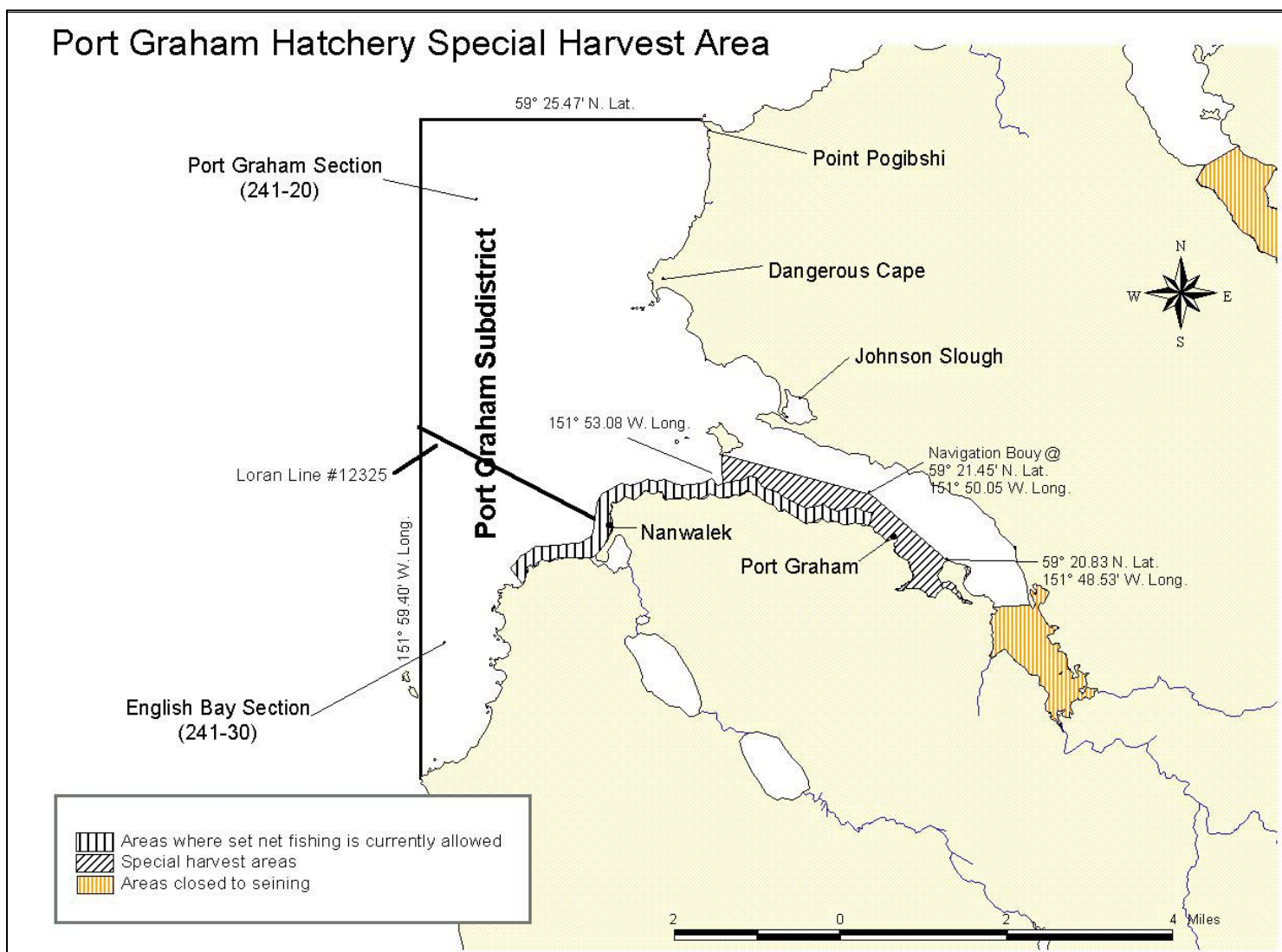




**Figure 4.**—Tutka Bay Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.

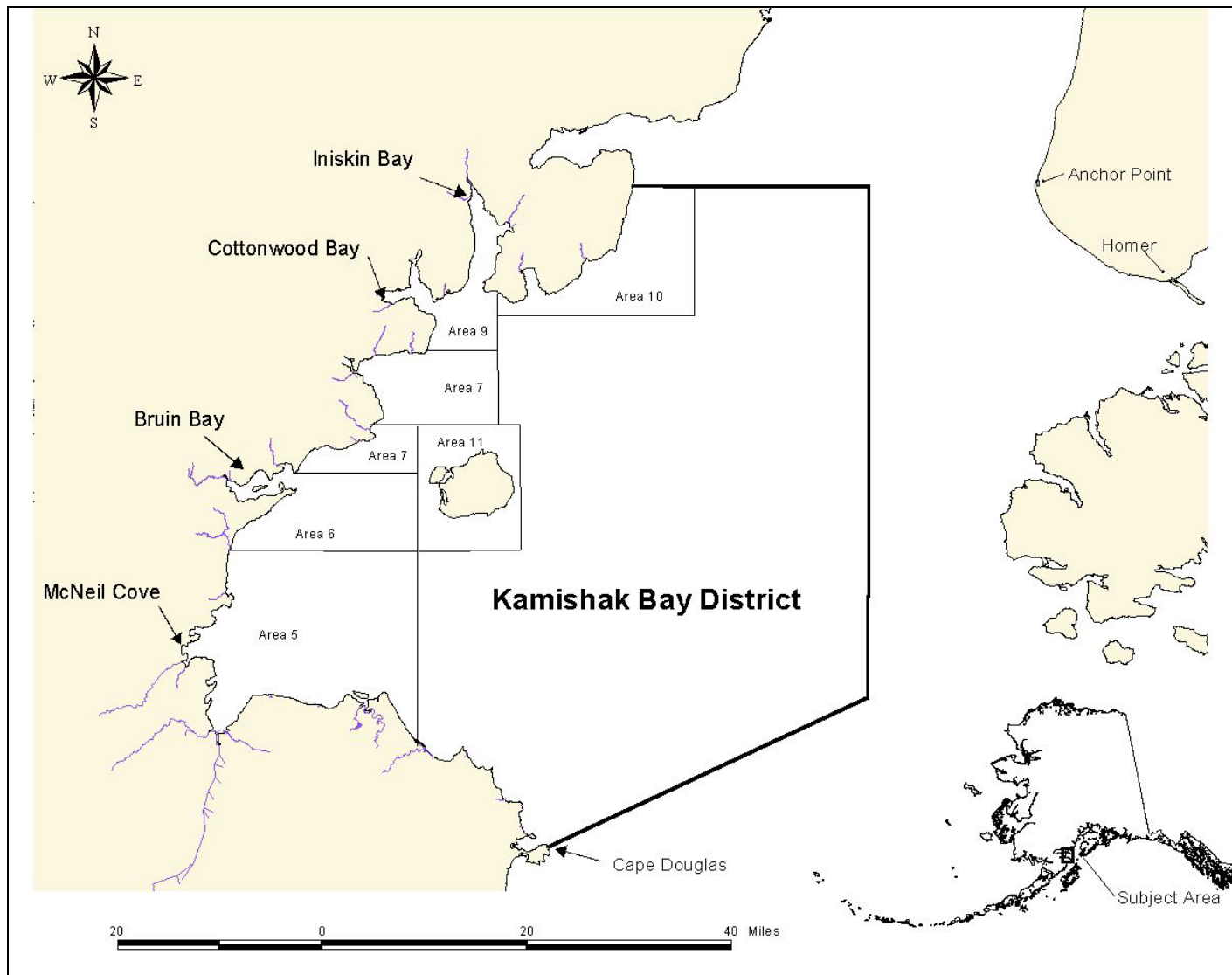


**Figure 5.**—Kirschner Lake Special Harvest Area for salmon hatchery cost recovery in Kamishak Bay District of Lower Cook Inlet.

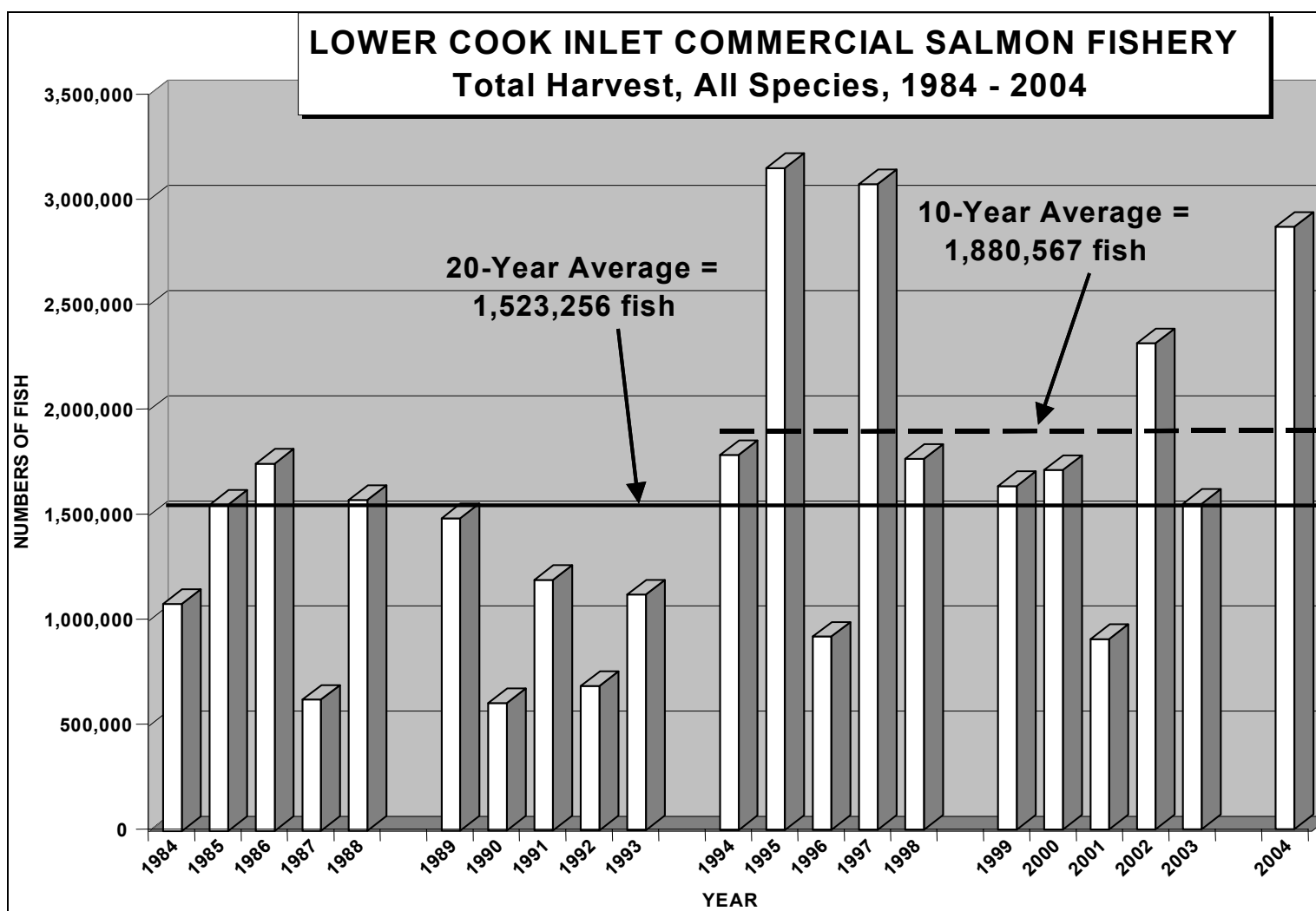


**Figure 6.**—Port Graham Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.

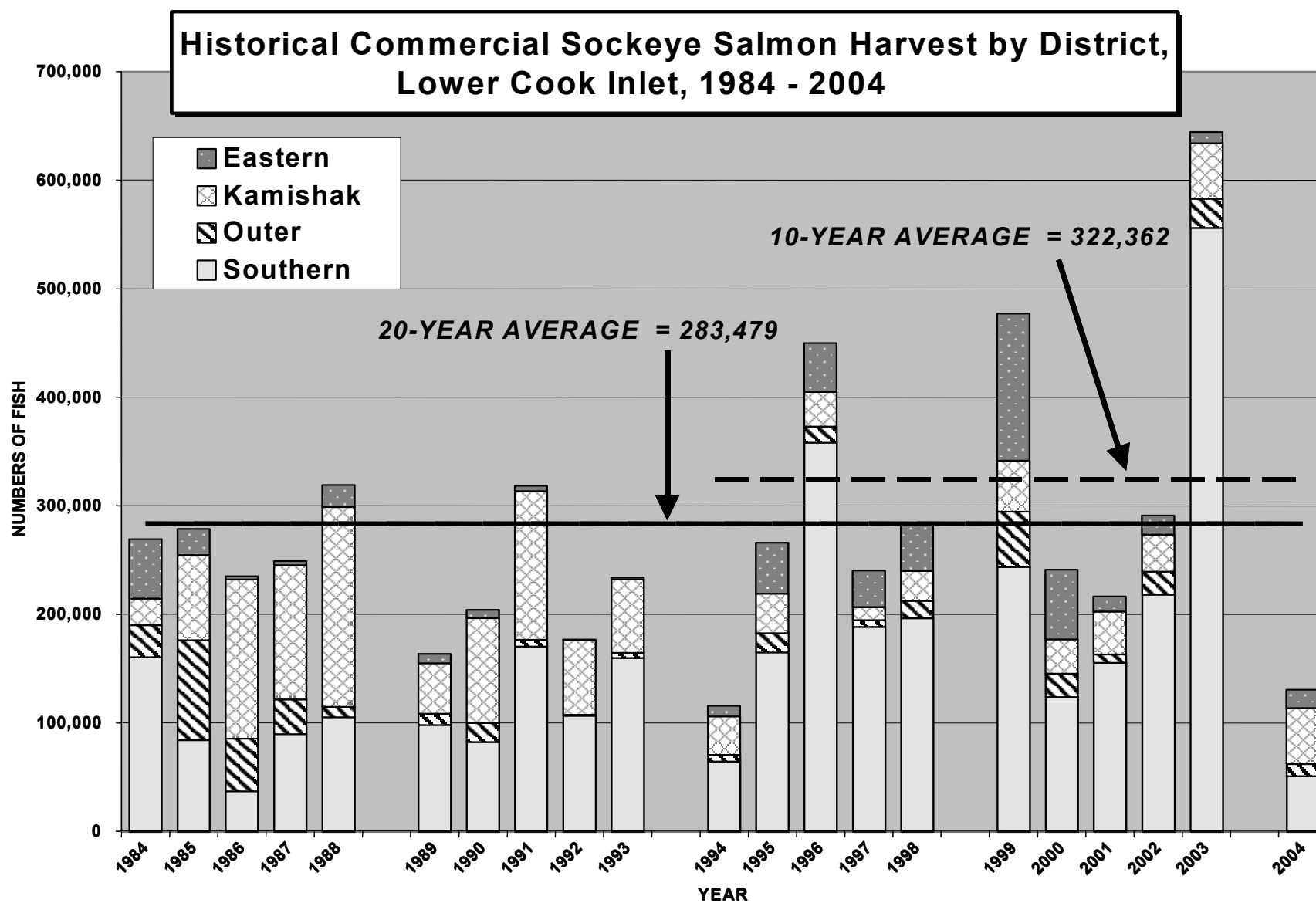




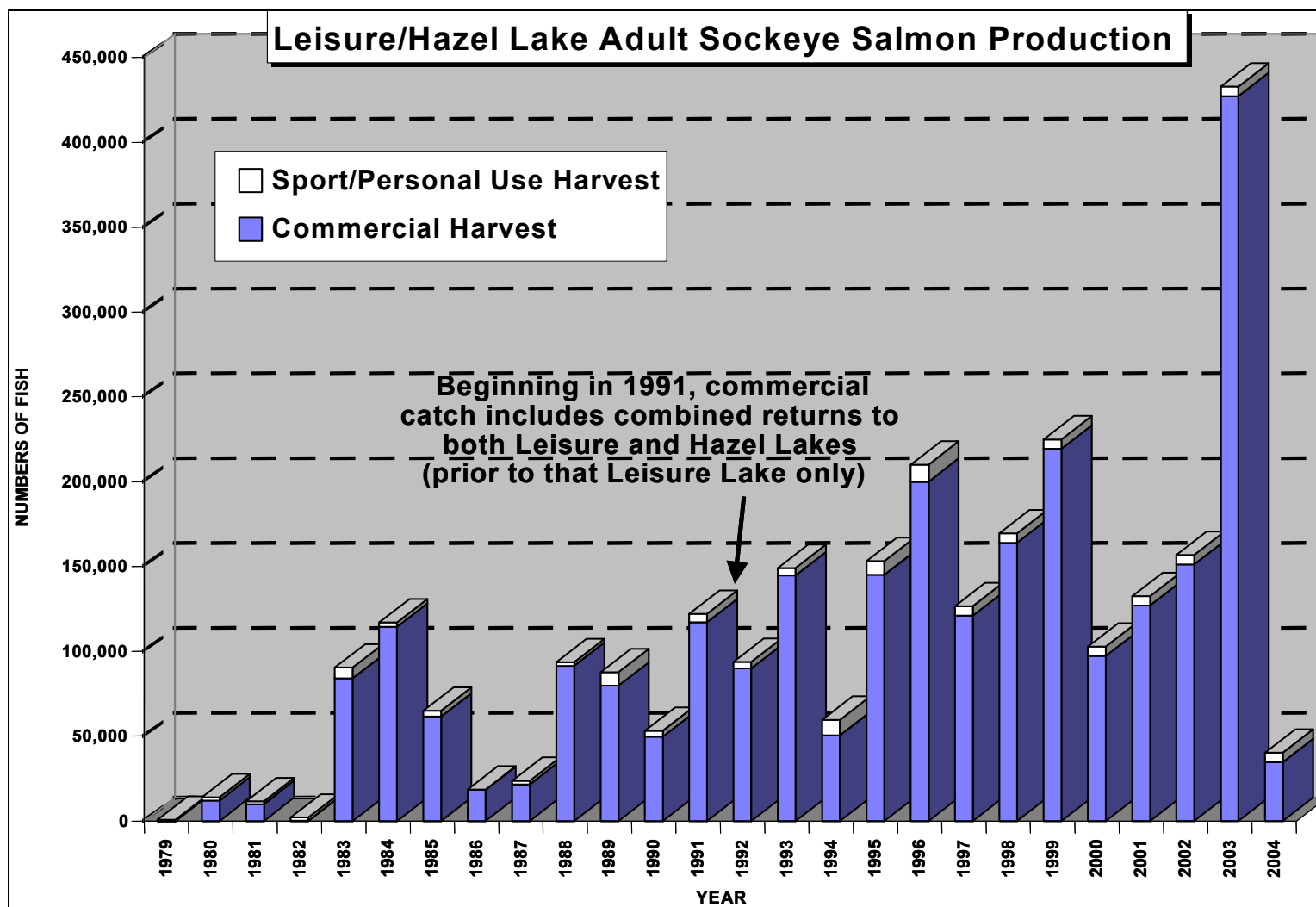
**Figure 7.**—Commercial herring fishing areas for management purposes in Kamishak Bay District of Lower Cook Inlet.



**Figure 8.**—Total commercial salmon catch, Lower Cook Inlet, 1984 – 2004.



**Figure 9** Commercial sockeye salmon catch by district, Lower Cook Inlet, 1984 – 2004.



**Figure 10.**—Sockeye salmon returns to Leisure and Hazel Lakes in the Southern District of Lower Cook Inlet, 1979 – 2004.

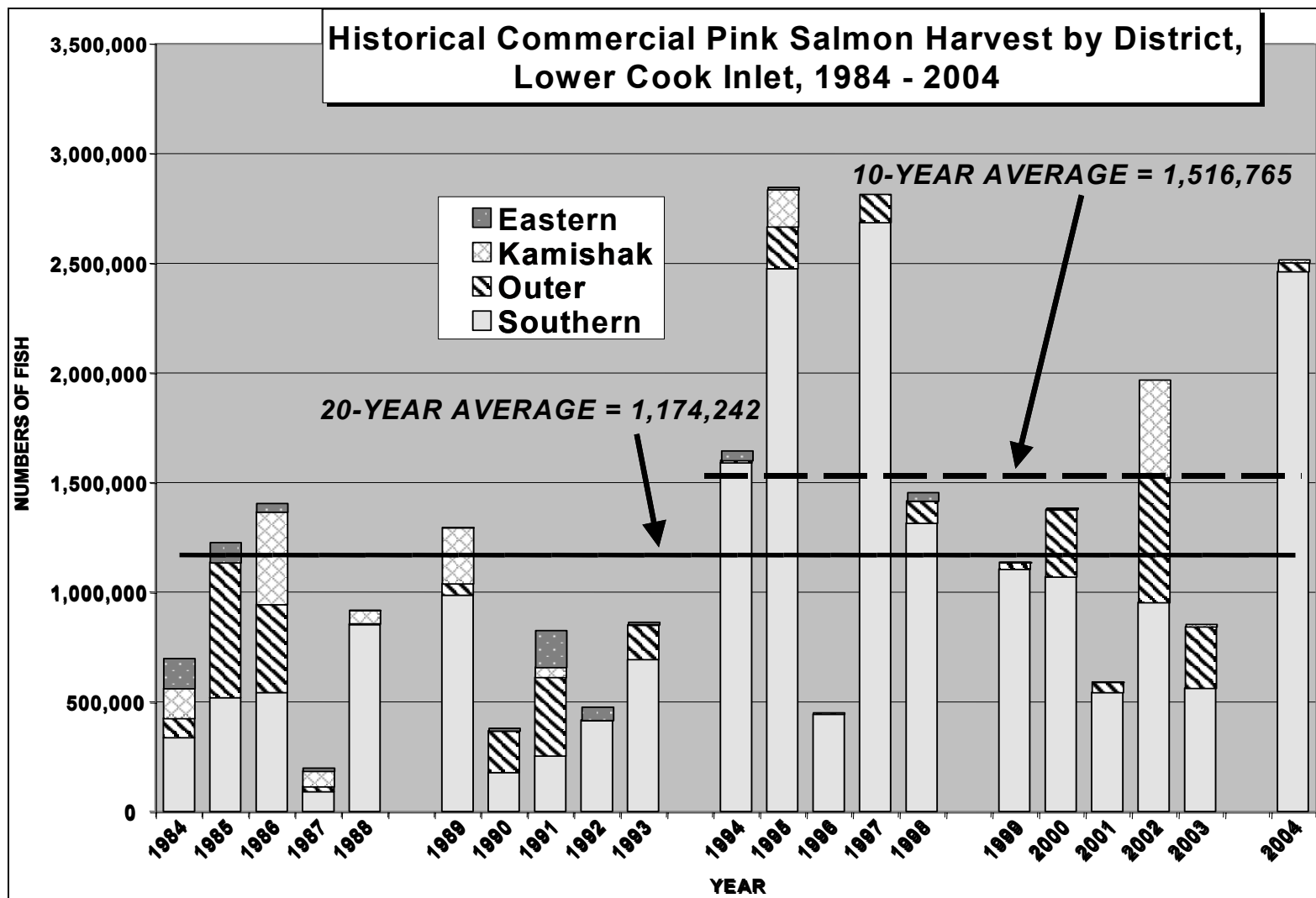
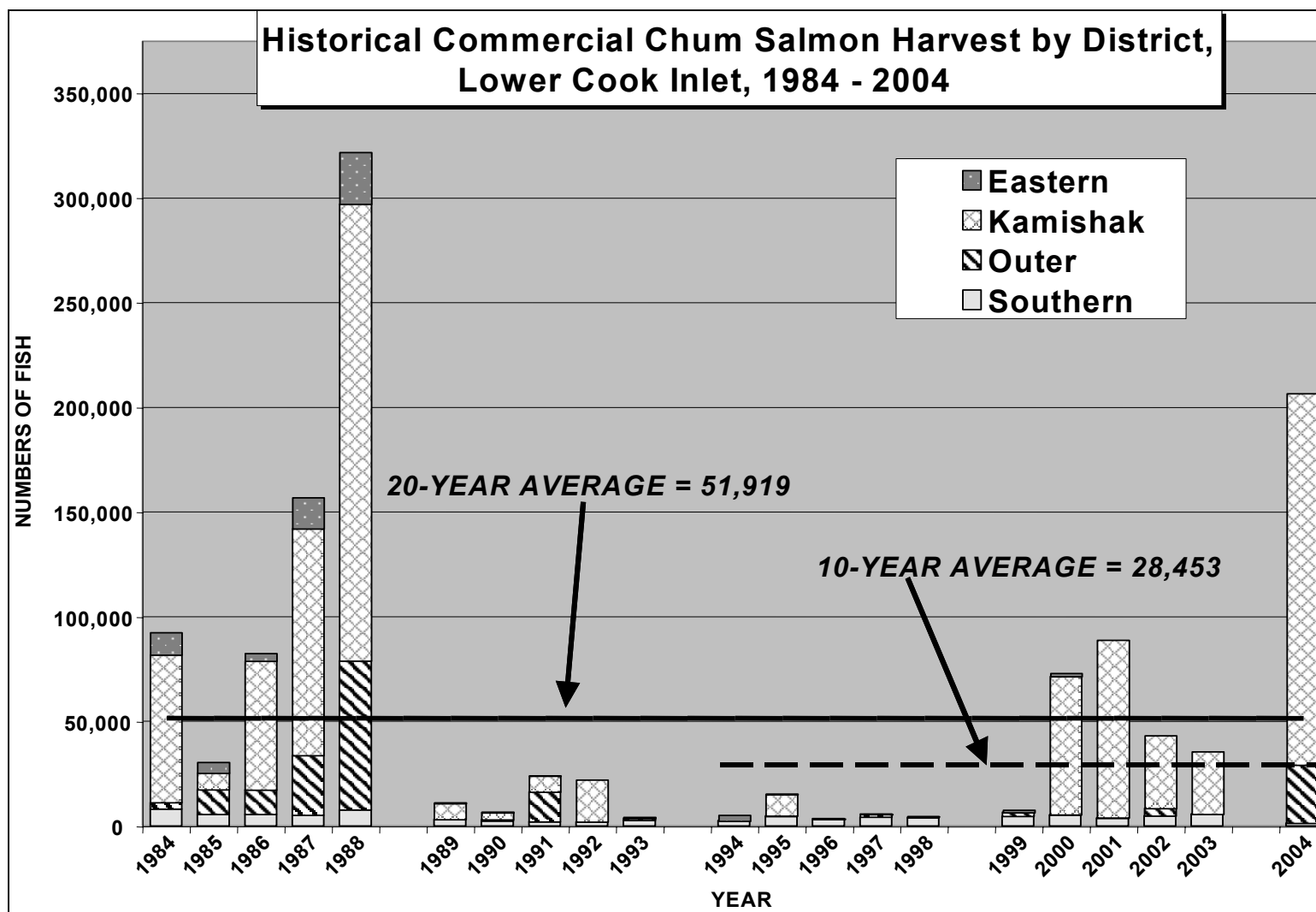
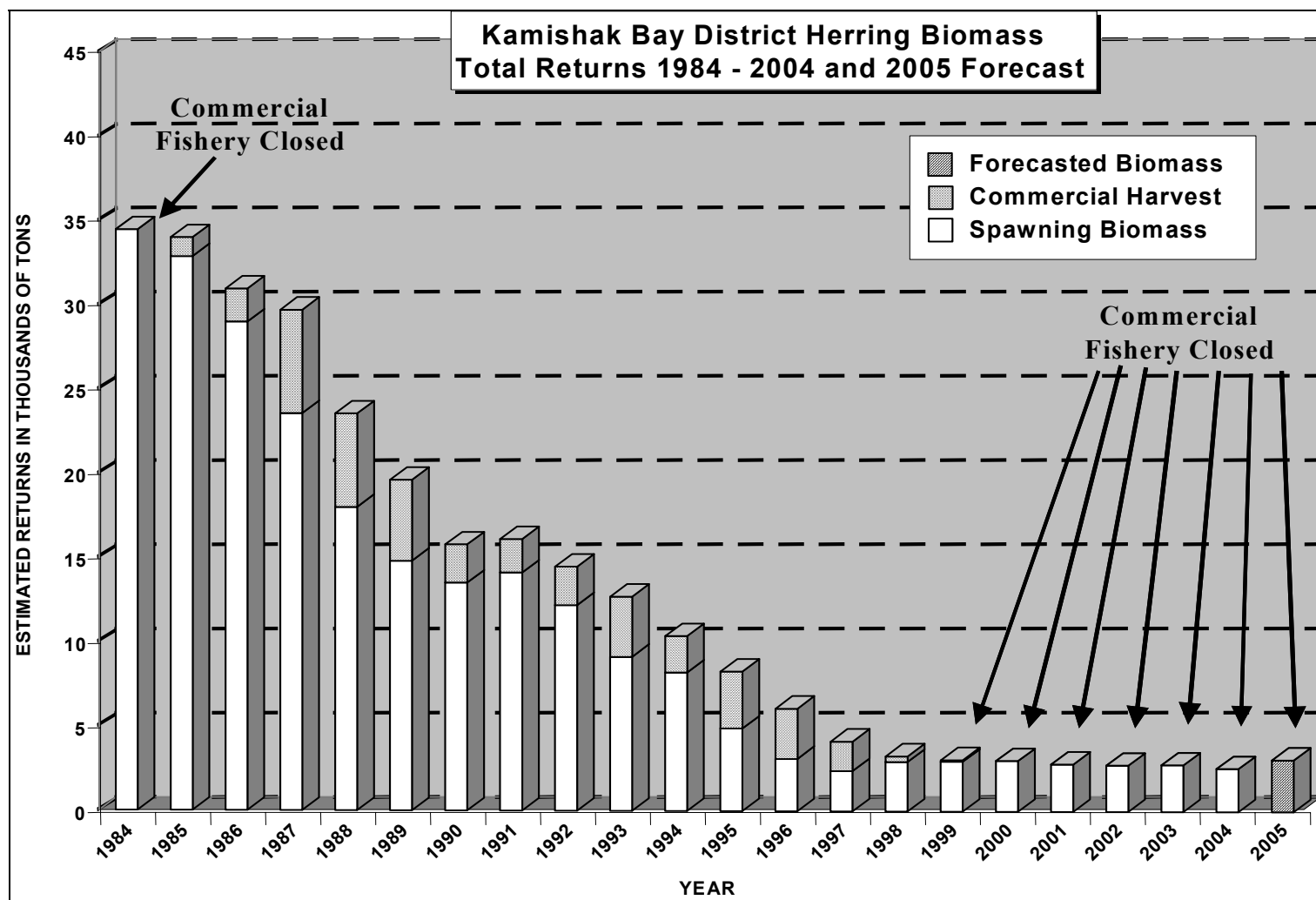


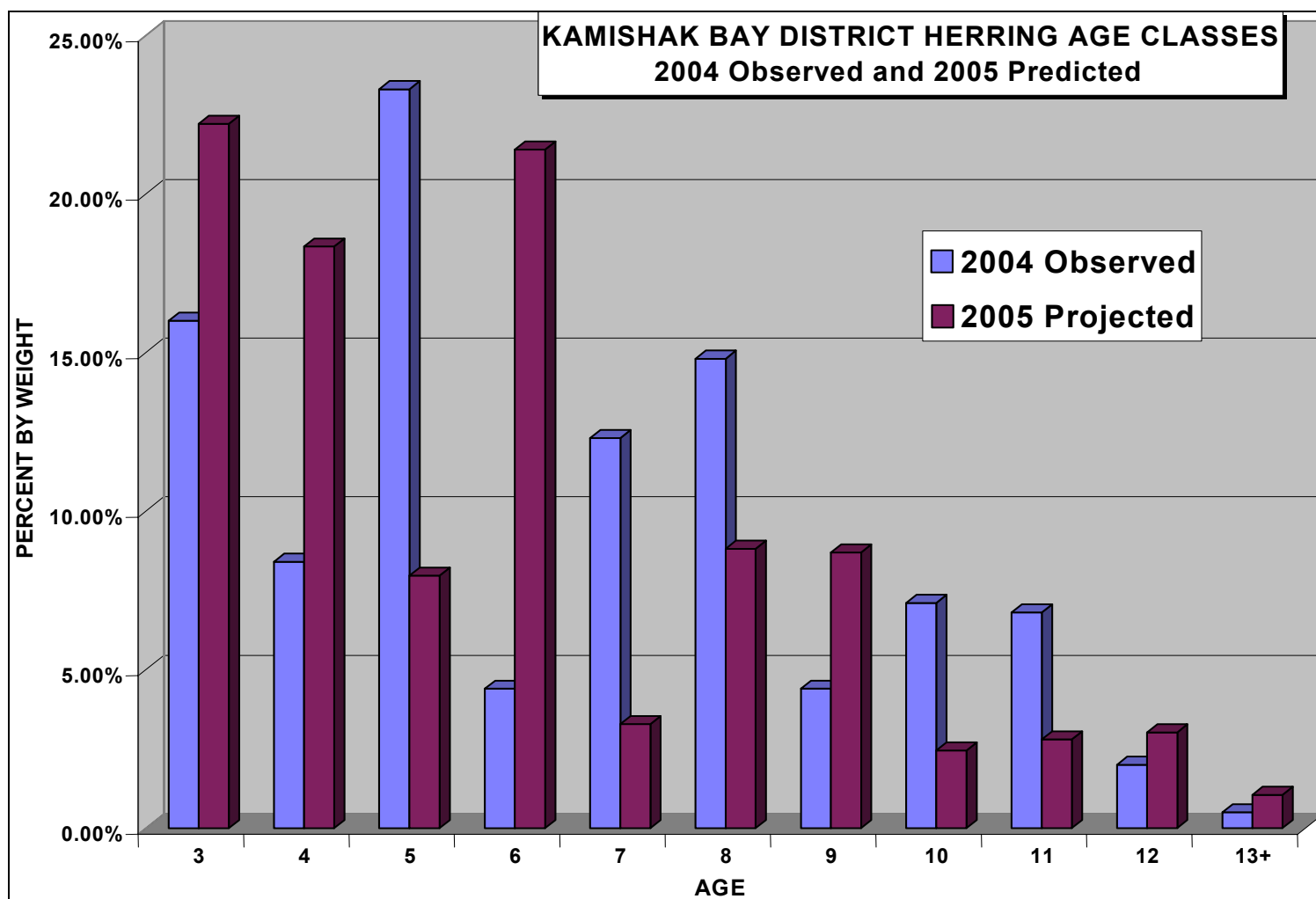
Figure 11.—Commercial pink salmon catch by district, Lower Cook Inlet, 1984–2004.



**Figure 12.**—Commercial chum salmon catch by district, Lower Cook Inlet, 1984–2004.



**Figure 13.**—Biomass estimates and commercial harvests of Pacific herring in the sac roe seine fishery, Kamishak Bay District, Lower Cook Inlet, 1984 – 2004, and 2005 projection.



**Figure 14.**—Herring age composition from samples collected in Kamishak Bay District, Lower Cook Inlet, 2004, and 2005 forecast.



## **APPENDIX A. HISTORICAL SALMON TABLES**

**Appendix A1.**—Salmon fishing permits issued and fished, by gear type, Lower Cook Inlet, 1984–2004.

Year	Seines				Set Net Permits Fished
	Permanent Permits	Interim Permits	Total Issued	Actively fished	
1984	78	3	81	54	35
1985	80	1	81	51	34
1986	79	0	79	62	34
1987	79	0	79	66	29
1988	79	0	79	71	27
1989	83	0	83	64	23
1990	82	1	83	71	20
1991	82	1	83	68	20
1992	82	1	83	63	21
1993	82	1	83	51	17
1994	82	1	83	32	16
1995	83	1	84	49	23
1996	84	1	85	34	24
1997	84	1	85	23	25
1998	84	1	85	41	24
1999	84	1	85	45	20
2000	84	1	85	36	24
2001	84	1	85	25	18
2002	84	1	85	25	24
2003	84	1	85	27	24
2004	84	2	85	24	19
1984-2003 Avg.	82	1	83	48	24
1994-2003 Avg.	84	1	85	34	22

*Source:* Commercial Fisheries Entry Commission and ADF&G fish ticket database.

**Appendix A2.**—Exvessel value of the commercial salmon harvest in thousands of dollars by species, Lower Cook Inlet, 1984–2004.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1984	23	1,393	120	635	242	2,413
1985	47	1,637	86	974	78	2,822
1986	21	1,414	132	1,245	201	3,013
1987	27	1,951	118	295	598	2,989
1988	32	3,812	127	2,237	2,548	8,756
1989	33	1,213	59	1,660	39	3,004
1990	29	1,287	28	306	31	1,681
1991 <sup>a</sup>	19	1,115	36	275	48	1,493
1992 <sup>a</sup>	30	1,152	19	212	53	1,466
1993 <sup>a</sup>	27	802	41	287	7	1,164
1994 <sup>a</sup>	18	496	93	745	9	1,361
1995 <sup>a</sup>	48	1,381	62	1,245	24	2,760
1996 <sup>a</sup>	26	2,113	42	100	5	2,286
1997 <sup>a</sup>	23	1,066	36	1,286	10	2,421
1998 <sup>a</sup>	20	1,224	37	712	9	2,002
1999 <sup>a</sup>	51	2,459	23	470	20	3,023
2000 <sup>a</sup>	31	1,112	19	431	192	1,786
2001 <sup>a</sup>	24	627	15	277	295	1,238
2002 <sup>a</sup>	24	817	18	441	58	1,359
2003 <sup>a</sup>	15	1,965	18	154	40	2,192
2004 <sup>a</sup>	32	503	40	352	339	1,266
20 Year Avg.	28	1,452	56	699	225	2,461
1984–1993 Avg.	29	1,578	77	813	385	2,880
1994–2003 Avg.	28	1,326	36	586	66	2,043
2004 % of Total	2.53%	39.73%	3.16%	27.80%	26.78%	100.00%

*Source:* Values obtained by using the formula: (average price per lb.) × (average weight per fish) × (catch) = Exvessel value; average prices are determined only from fish ticket information and may not reflect retroactive or postseason adjustments.

<sup>a</sup> Includes hatchery cost recovery.

**Appendix A3.**—Average salmon price in dollars per pound by species, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>
1984	1.29	1.05	0.77	0.26	0.28
1985	1.60	1.25	0.85	0.22	0.31
1986	1.25	1.40	0.85	0.26	0.30
1987	1.25	1.60	1.00	0.42	0.46
1988	1.25	2.50	1.80	0.80	0.84
1989	1.25	1.60	0.70	0.40	0.40
1990	1.35	1.55	0.60	0.30	0.50
1991	1.12	0.83	0.29	0.13	0.27
1992	1.29	1.47	0.43	0.14	0.27
1993	1.02	0.80	0.51	0.12	0.28
1994	0.95	1.06	0.62	0.15	0.25
1995	1.17	1.11	0.47	0.15	0.24
1996	1.33	0.91	0.40	0.08	0.18
1997	1.29	0.93 <sup>a</sup>	0.50 <sup>a</sup>	0.15	0.23
1998	1.45	0.96 <sup>a</sup>	0.36 <sup>a</sup>	0.16	0.27
1999	1.96	1.22 <sup>a</sup>	0.45 <sup>a</sup>	0.16	0.32
2000	1.86	0.87 <sup>a</sup>	0.60 <sup>a</sup>	0.12	0.28
2001	1.76	0.62 <sup>a</sup>	0.41 <sup>a</sup>	0.15	0.28
2002	1.11	0.55 <sup>a</sup>	0.33 <sup>a</sup>	0.07	0.16
2003	1.03	0.60 <sup>a</sup>	0.28 <sup>a</sup>	0.06	0.16
2004	1.56	0.77 <sup>a</sup>	0.47 <sup>a</sup>	0.04	0.20
20-Year Avg.	1.33	1.14	0.61	0.22	0.31
1984-93 Avg.	1.27	1.41	0.78	0.31	0.39
1994-2003 Avg.	1.39	0.88	0.44	0.13	0.24

*Note:* Average prices are determined only from fish ticket information and may not reflect retroactive or postseason adjustments.

<sup>a</sup> Average price for sockeye and coho include only those fish actually sold and does not include hatchery cost recovery fish that were donated, discarded, or harvested but not paid for due to contractual agreement with the processor.

**Appendix A4.**—Salmon average weight in pounds per fish by species in the commercial fishery, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>
1984	28.8	4.7	8.8	3.5	8.9
1985	28.0	4.7	9.8	3.5	8.2
1986	20.6	4.3	8.6	3.4	8.1
1987	18.1	4.9	8.2	3.5	8.3
1988	15.3	4.8	8.9	3.0	9.4
1989	14.1	4.6	7.0	3.1	8.6
1990	13.8	4.1	7.1	2.8	8.9
1991	12.3	4.2	6.6	2.6	7.5
1992	12.3	4.4	7.7	3.2	8.8
1993	12.0	4.4	6.0	2.7	6.2
1994	15.0	4.1	10.2	3.0	6.4
1995	17.8	4.7	7.4	2.9	6.4
1996	16.9	5.2	7.6	2.9	8.0
1997	13.9	4.9	7.8	3.1	7.6
1998	13.1	4.6	8.5	3.1	7.4
1999	14.8	4.7	6.6	2.5	7.9
2000	14.7	5.3	8.2	2.5	9.3
2001	13.6	4.9	7.5	3.1	9.4
2002	14.0	5.2	7.8	3.4	8.3
2003	12.6	5.1	6.8	3.2	7.2
2004	12.4	5.0	7.5	3.4	8.2
20-Year Avg.	16.1	4.7	7.9	3.1	8.0
1984-93 Avg.	17.5	4.5	7.9	3.1	8.3
1994-2003 Avg.	14.6	4.9	7.9	3.0	7.8

*Source:* Values obtained from ADF&G fish ticket database.

**Appendix A5.**—Commercial salmon catch in numbers of fish by species, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>	<b>Total</b>
1984	714	268,950	16,797	700,622	92,540	1,079,623
1985	1,043	278,694	10,327	1,229,708	30,640	1,550,412
1986	796	234,861	18,852	1,408,293	82,688	1,745,490
1987	1,179	248,848	14,354	201,429	157,018	622,828
1988	1,694	319,008	7,946	921,296	321,911	1,571,855
1989	1,893	163,271	12,089	1,296,926	11,305	1,485,484
1990	1,560	203,895	9,297	383,670	6,951	605,373
1991	1,419	317,947	19,047	828,709	24,232	1,191,354
1992	1,891	176,644	5,902	479,768	22,203	686,408
1993	2,168	233,834	13,477	866,774	4,367	1,120,620
1994	1,231	115,418	14,673	1,647,929	5,469	1,784,720
1995	2,303	265,423	17,709	2,848,464	15,636	3,149,535
1996	1,181	449,685	13,572	451,506	3,764	919,708
1997	1,261	240,173	11,004	2,814,431	5,908	3,072,777
1998	1,071	284,029	16,653	1,457,819	4,647	1,764,219
1999	1,764	476,779	8,033	1,140,488	7,941	1,635,005
2000	1,188	240,932	8,203	1,387,307	73,254	1,710,884
2001	988	216,271	6,667	592,931	88,969	905,826
2002	1,553	290,654	8,329	1,970,061	43,259	2,313,856
2003	1,180	644,257	11,302	856,711	35,686	1,549,136
2004 <sup>a</sup>	1,660	130,121	12,436	2,517,564	206,683	2,868,464
20-Year Avg.	1,404	283,479	12,212	1,174,242	51,919	1,523,256
1984-93 Avg.	1,436	244,595	12,809	831,720	75,386	1,165,945
1994-2003 Avg.	1,372	322,363	11,615	1,516,765	28,453	1,880,568
2004 % of Total	0.06%	4.54%	0.43%	87.77%	7.21%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A6.**—Commercial salmon catch in numbers of fish by species in the Southern District, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>	<b>Total</b>
1984	661	160,654	3,193	336,595	8,065	509,168
1985	1,007	84,149	4,258	518,889	5,513	613,816
1986	776	36,838	3,095	542,521	5,560	588,790
1987	1,158	89,662	2,163	90,522	5,030	188,535
1988	1,655	105,302	2,987	852,382	7,742	970,068
1989	1,889	98,052	6,667	987,488	3,141	1,097,237
1990	1,546	82,412	1,552	178,087	2,433	266,030
1991	1,399	170,224	9,415	253,962	1,962	436,962
1992	1,852	106,793	1,277	417,021	1,885	528,828
1993	2,162	159,747	4,431	692,794	2,788	861,922
1994	1,230	64,531	1,373	1,589,709	2,631	1,659,474
1995	2,289	164,798	5,161	2,475,312	4,530	2,652,090
1996	1,180	358,163	9,543	444,236	3,511	816,633
1997	1,261	188,402	5,597	2,685,764	4,260	2,885,284
1998	1,070	196,262	2,243	1,315,042	3,956	1,518,534
1999	1,760	243,444	2,757	1,105,267	4,624	1,357,852
2000	1,184	123,574	768	1,070,065	5,340	1,200,931
2001	986	155,411	2,706	542,975	3,789	705,867
2002	1,553	218,203	3,769	953,960	4,803	1,182,288
2003	1,179	556,037	5,408	563,043	5,730	1,131,397
2004 <sup>a</sup>	1,658	50,737	1,441	2,461,959	1,376	2,517,171
20-Year Avg.	1,390	168,133	3,918	880,782	4,365	1,058,588
1984-93 Avg.	1,411	109,383	3,904	487,026	4,412	606,136
1994-2003 Avg.	1,369	226,884	3,933	1,274,537	4,317	1,511,040
2004 % of Total	0.07%	2.02%	0.06%	97.81%	0.05%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A7.**—Commercial set gillnet catch of salmon in numbers of fish by species in the Southern District, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>	<b>Total</b>
1984	639	40,987	2,862	17,836	5,008	67,332
1985	958	23,188	3,908	22,898	4,221	55,173
1986	745	21,807	2,827	14,244	2,426	42,049
1987	653	28,209	2,025	9,224	2,419	42,530
1988	1,145	14,758	2,819	29,268	4,423	52,413
1989	1,281	13,970	4,792	16,210	1,877	38,130
1990	1,361	15,863	1,046	12,646	1,938	32,854
1991	842	20,525	5,011	3,954	1,577	31,909
1992	1,288	17,002	848	15,958	1,687	36,783
1993	1,089	14,791	3,088	12,008	2,591	33,567
1994	1,103	14,004	1,073	23,621	2,419	42,220
1995	2,078	19,406	3,564	41,654	3,958	70,660
1996	1,054	69,338	5,779	14,813	2,792	93,776
1997	1,135	59,401	4,475	64,162	4,166	133,339
1998	952	26,131	1,057	24,403	3,754	56,297
1999	1,491	27,646	1,374	5,348	4,313	40,194
2000	1,019	26,503	621	21,845	5,214	55,202
2001	865	28,503	1,811	13,393	3,487	48,059
2002	1,513	46,812	2,393	6,741	4,681	62,140
2003	878	81,722	2,291	7,325	4,998	97,214
2004 <sup>a</sup>	1,402	16,125	1,174	843	1,238	20,782
20-Year Avg.	1,105	30,529	2,683	18,878	3,399	56,593
1984-93 Avg.	1,000	21,110	2,923	15,425	2,817	43,274
1994-2003 Avg.	1,209	39,948	2,444	22,331	3,980	69,911
2004 % of Total	6.75%	77.59%	5.65%	4.06%	5.96%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.



**Appendix A8.**—Commercial salmon catch in numbers of fish by species in the Outer District, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>	<b>Total</b>
1984	3	29,276	41	89,085	3,204	121,609
1985	19	91,957	3,210	618,222	11,844	725,252
1986	6	48,472	5,052	401,755	11,701	466,986
1987	14	31,845	2,481	23,890	28,663	86,893
1988	5	9,501	2	6,094	71,202	86,804
1989	1	10,286	72	52,677	43	63,079
1990	2	17,404	74	191,320	614	209,414
1991	2	6,408	12	359,664	14,337	380,423
1992	0	572	1	146	181	900
1993	2	4,613	119	159,159	970	164,863
1994	0	5,930	993	13,200	32	20,155
1995	12	17,642	1,272	192,098	474	211,498
1996	0	14,999	96	7,199	3	22,297
1997	0	6,255	63	128,373	1,575	136,266
1998	0	15,991	45	102,172	611	118,819
1999	3	51,117	1,482	32,484	2,062	87,148
2000	2	21,623	20	306,555	302	328,502
2001	0	7,339	5	48,559	408	56,311
2002	0	21,154	74	569,955	3,810	594,993
2003	1	26,615	4	281,663	137	308,420
2004	2	11,082	13	42,636	27,911	81,644
20-Year Avg.	4	21,950	756	179,214	7,609	209,532
1984-93 Avg.	5	25,033	1,106	190,201	14,276	230,622
1994-2003 Avg.	2	18,867	405	168,226	941	188,441
2004 % of Total	0.00%	13.57%	0.02%	52.22%	34.19%	100.00%

Source: ADF&G fish ticket database.

**Appendix A9.**—Commercial salmon catch in numbers of fish by species in the Eastern District, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>	<b>Total</b>
1984	47	54,420	536	136,797	10,535	202,335
1985	11	24,338	835	92,403	5,144	122,731
1986	0	3,055	770	40,243	3,757	47,825
1987	0	3,687	1,631	14,333	14,913	34,564
1988	1	20,253	486	1,740	24,668	47,148
1989	0	8,538	5,346	92	312	14,288
1990	0	7,682	7,645	11,815	307	27,449
1991	1	4,703	7,283	167,250	80	179,317
1992	0	432	3,136	60,007	86	63,661
1993	0	1,824	8,924	10,616	9	21,373
1994	1	9,661	10,410	44,987	2,792	67,851
1995	0	46,556	5,192	12,000	330	64,078
1996	0	44,919	3,932	36	223	49,110
1997	0	33,783	5,344	1	66	39,194
1998	1	44,274	14,365	38,829	51	97,520
1999	1	135,305	3,794	1,930	1,232	142,262
2000	1	64,099	7,408	4,473	1,540	77,521
2001	0	13,809	3,947	0	6	17,762
2002	0	17,376	4,432	0	5	21,813
2003	0	10,352	5,886	0	19	16,257
2004	0	16,645	5,615	0	1	22,261
20-Year Avg.	3	27,453	5,065	31,878	3,304	67,703
1984-93 Avg.	6	12,893	3,659	53,530	5,981	76,069
1994-2003 Avg.	0	42,013	6,471	10,226	626	59,337
2004 % of Total	0.00%	74.77%	25.22%	0.00%	0.00%	100.00%

Source: ADF&G fish ticket database.

**Appendix A10.**—Commercial salmon catch in numbers of fish by species in the Kamishak Bay District, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Chinook</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>	<b>Total</b>
1984	3	24,600	13,027	138,145	70,736	246,511
1985	6	78,250	2,024	194	8,139	88,613
1986	14	146,496	9,935	423,774	61,670	641,889
1987	7	123,654	8,079	72,684	108,412	312,836
1988	33	183,952	4,471	61,080	218,299	467,835
1989	3	46,395	4	256,669	7,809	310,880
1990	12	96,397	26	2,448	3,597	102,480
1991	17	136,612	2,337	47,833	7,853	194,652
1992	39	68,847	1,488	2,594	20,051	93,019
1993	4	67,650	3	4,205	600	72,462
1994	0	35,296	1,897	33	14	37,240
1995	2	36,427	6,084	169,054	10,302	221,869
1996	1	31,604	1	35	27	31,668
1997	0	11,733	0	293	7	12,033
1998	0	27,502	0	1,776	29	29,307
1999	0	46,913	0	807	23	47,743
2000	1	31,636	7	6,214	66,072	103,930
2001	2	39,712	9	1,397	84,766	125,886
2002	0	33,921	54	446,146	34,641	514,762
2003	0	51,253	4	12,005	29,800	93,062
2004	0	51,657	5,367	12,969	177,395	247,388
20-Year Avg.	7	65,943	2,473	82,369	36,642	187,434
1984-93 Avg.	14	97,285	4,139	100,963	50,717	253,118
1994-2003 Avg.	1	34,600	806	63,776	22,568	121,750
2004 % of Total	0.00%	20.88%	2.17%	5.24%	71.71%	100.00%

Source: ADF&G fish ticket database.

**Appendix A11.**—Total commercial salmon catch in numbers of fish by district, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Southern</b>	<b>Outer</b>	<b>Kamishak</b>	<b>Eastern</b>	<b>Total</b>
1984	509,168	121,609	246,511	202,335	1,079,623
1985	613,816	725,252	88,613	122,731	1,550,412
1986	588,790	466,986	641,889	47,825	1,745,490
1987	188,535	86,893	312,836	34,564	622,828
1988	970,068	86,804	467,835	47,148	1,571,855
1989	1,097,237	63,079	310,880	14,288	1,485,484
1990	266,030	209,414	102,480	27,449	605,373
1991	436,962	380,423	194,652	179,317	1,191,354
1992	528,828	900	93,019	63,661	686,408
1993	861,922	164,863	72,462	21,373	1,120,620
1994	1,659,474	20,155	37,240	67,851	1,784,720
1995	2,652,090	211,498	221,869	64,078	3,149,535
1996	816,633	22,297	31,668	49,110	919,708
1997	2,885,284	136,266	12,033	39,194	3,072,777
1998	1,518,573	118,819	29,307	97,520	1,764,219
1999	1,357,852	87,148	47,743	142,262	1,635,005
2000	1,200,931	328,502	103,930	78,227	1,711,590
2001	705,867	56,311	125,886	17,762	905,826
2002	1,182,288	594,993	514,762	21,813	2,313,856
2003	1,131,397	308,420	93,062	16,257	1,549,136
2004	2,517,171 <sup>a</sup>	81,644	247,388	22,261	2,868,464
20-Year Avg.	1,058,588	209,532	187,434	67,703	1,523,256
1984-93 Avg.	606,136	230,622	253,118	76,069	1,165,945
1994-2003 Avg.	1,511,040	188,441	121,750	59,337	1,880,567
2004 % of Total	87.75%	2.85%	8.62%	0.78%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A12.**—Commercial Chinook salmon catch in numbers of fish by district, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Southern</b>	<b>Outer</b>	<b>Kamishak</b>	<b>Eastern</b>	<b>Total</b>
1984	661	3	3	47	714
1985	1,007	19	6	11	1,043
1986	776	6	14	0	796
1987	1,158	14	7	0	1,179
1988	1,655	5	33	1	1,694
1989	1,889	1	3	0	1,893
1990	1,546	2	12	0	1,560
1991	1,399	2	17	1	1,419
1992	1,852	0	39	0	1,891
1993	2,162	2	4	0	2,168
1994	1,230	0	0	1	1,231
1995	2,289	12	2	0	2,303
1996	1,180	0	1	0	1,181
1997	1,261	0	0	0	1,261
1998	1,070	0	0	1	1,071
1999	1,760	3	0	1	1,764
2000	1,184	2	1	1	1,188
2001	986	0	2	0	988
2002	1,553	0	0	0	1,553
2003	1,179	1	0	0	1,180
2004	1,658 <sup>a</sup>	2	0	0	1,660
20-Year Avg.	1,390	4	7	3	1,404
1984-93 Avg.	1,411	5	14	6	1,436
1994-2003 Avg.	1,369	2	1	0	1,372
2004 % of Total	99.88%	0.12%	0.00%	0.00%	100.00%

*Source:* ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A13.**—Commercial sockeye salmon catch in numbers of fish by district, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Southern</b>	<b>Outer</b>	<b>Kamishak</b>	<b>Eastern</b>	<b>Total</b>
1984	160,654	29,276	24,600	54,420	268,950
1985	84,149	91,957	78,250	24,338	278,694
1986	36,838	48,472	146,496	3,055	234,861
1987	89,662	31,845	123,654	3,687	248,848
1988	105,302	9,501	183,952	20,253	319,008
1989	98,052	10,286	46,395	8,538	163,271
1990	82,412	17,404	96,397	7,682	203,895
1991	170,224	6,408	136,612	4,703	317,947
1992	106,793	572	68,847	432	176,644
1993	159,747	4,613	67,650	1,824	233,834
1994	64,531	5,930	35,296	9,661	115,418
1995	164,798	17,642	36,427	46,556	265,423
1996	358,163	14,999	31,604	44,919	449,685
1997	188,402	6,255	11,733	33,783	240,173
1998	196,262	15,991	27,502	44,274	284,029
1999	243,444	51,117	46,913	135,305	476,779
2000	123,574	21,623	31,636	64,099	240,932
2001	155,411	7,339	39,712	13,809	216,271
2002	218,203	21,154	33,921	17,376	290,654
2003	556,037	26,615	51,253	10,352	644,257
2004	50,737 <sup>a</sup>	11,082	51,657	16,645	130,121
20-Year Avg.	168,133	21,950	65,943	27,453	283,479
1984-93 Avg.	109,383	25,033	97,285	12,893	244,595
1994-2003 Avg.	226,884	18,867	34,600	42,013	322,362
2004 % of Total	38.99%	8.52%	39.70%	12.79%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A14.**—Commercial sockeye salmon catch in thousands of fish by subdistrict, Lower Cook Inlet, 1959–2004.

Location	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Resurrection Bay	0	0.1	0	0	0	0	0	0	0	74.5	99.4	1.8	2.2
Aialik Bay	1.3	0.2	4.3	2.6	0.5	0	0	0	0	0	0	3.1	0
Nuka Bay	8.3	6.7	8.2	5.1	0.5	0	2.0	0	2.2	1.5	0	1.0	1.6
Port Dick	0	0	0	0	0	0	0	0	0	0	0	0	0
Halibut Cove & Lagoon	1.3	1.4	0.8	2.0	1.1	0.7	1.4	1.5	1.9	2.7	1.7	1.3	1.3
Tutka/Barabara	1.1	1.7	3.0	5.2	2.9	9.0	5.2	6.0	11.8	6.3	5.6	6.0	10.0
Seldovia Bay	0.4	1.2	1.2	1.7	1.2	2.1	0.9	1.0	2.2	1.9	1.1	1.2	1.5
Port Graham Bay	6.6	7.8	5.2	6.8	7.8	5.5	3.5	2.7	10.4	7.7	4.3	3.7	5.6
Kamishak/Douglas	0	0	0	0	0	0	0	0	0	0	0	0	0
McNeil (Mikfik)	0	0.7	0	0	0	1.9	0.2	0	0	0	8.9	2.8	0
Paint River	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenik Lake	0	0	0	0	0	0	0	0	0.2	0	1.9	0	0
Bruin/Kirschner	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	2.6	4.9	0.1	1.9	1.1	1.5	0.8	4.1	0.3	0.6	0.1	0	0
Totals	21.6	24.7	22.8	25.3	15.1	20.7	14.0	15.3	29.0	95.2	122.8	20.9	22.2

Location	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Resurrection Bay	0.1	0	0	0	0	0	0	0	0	0.6	0	0	3.4
Aialik Bay	0.3	3.1	0.2	0.6	0	5.8	0	0	0.1	8.7	3.0	25.9	50.8
Nuka Bay	26.1	1.1	0.1	0	18.9	31.1	10.6	24.4	21.5	17.2	66.3	16.8	29.2
Port Dick	0	0	0	0	0	0	0	0	0	0	0	0	0
Halibut Cove & Lagoon	3.7	2.1	3.0	3.4	5.1	3.6	12.9	5.3	11.5	11.2	1.2	77.7	116.6
Tutka/Barabara	14.8	8.1	10.8	12.6	14.2	21.3	92.1	15.6	13.2	41.0	15.8	35.9	26.7
Seldovia Bay	2.3	2.2	2.3	2.1	2.1	3.0	5.6	2.6	1.6	5.3	5.0	6.7	4.9
Port Graham Bay	10.5	11.7	10.9	9.2	13.6	16.6	30.5	12.9	16.5	20.3	21.5	13.4	12.5
Kamishak/Douglas	0	0	0	0	0.2	5.3	4.6	0.5	0	4.9	0	2.8	0
McNeil (Mikfik)	0	0	0	0	3.8	2.1	0	1.2	3.9	0	17.8	5.8	10.7
Paint River	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenik Lake	0	0	0	0	0	0	0	0	0	0	0.3	2.7	13.9
Bruin/Kirschner	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0.1	0.8	0.1	0.2	0.3	2.8	0.1	1.9	1.1	1.1	0.4	0	0.3
Totals	57.9	29.1	27.4	28.1	58.2	101.6	156.4	64.4	69.4	110.3	131.3	187.6	269.0

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**Appendix A14.**—Page 2 of 2.

Location	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Resurrection Bay	0.3	0	0.2	0	0	0	0	0	1.7	9.0	44.6	43.9	31.7
Aialik Bay	24.1	3.0	3.5	20.2	8.5	7.7	4.7	0.4	0.2	0.6	2.0	1.0	2.1
Nuka Bay	91.8	48.4	31.8	9.5	10.3	5.7	1.8	0	3.5	5.9	17.6	15.0	6.2
Port Dick	0	0	0	0	0	11.7	4.6	0.6	1.0	0	0	0	0
Halibut Cove & Lagoon	63.2	15.2	69.1	24.9	46.6	20.3	36.0	14.7	19.0	12.2	9.0	75.3	12.3
China Poot <sup>c</sup>				63.6	35.8	49.9	116.7	76.0	127.6	38.7	133.4	225.2	116.1
Tutka/Barabara	14.9	16.3	14.7	12.9	13.4	7.9	13.4	12.9	8.4	11.0	15.4	27.8	14.4
Seldovia Bay	2.6	3.2	3.5	2.5	1.8	4.3	4.0	3.3	4.4	2.7	4.2	11.9	12.5
Port Graham Bay	3.5	2.0	2.4	1.4	0	0	0	0	0	0	2.6	17.9	33.1
Kamishak/Douglas	0.7	7.6	2.3	5	0	0.1	7.0	9.9	1.3	3.4	2.7	0	2.6
McNeil (Mikfik)	67.0	27.5	21.4	14.6	7.0	9.1	12.9	4.0	0.9	0	0.1	0	0.2
Paint River	0	0	0	0	0	0	0.4	0	0	0	0	0	0
Chenik Lake	10.6	111.3	98.5	164.2	38.9	70.3	60.4	14.4	24.6	0	0	0	0
Bruin/Kirschner	0	0	0	0	0.2	14.5	55.9	40.5	39.7	31.9	33.6	31.6	9.0
Miscellaneous	0	0.4	1.6	0.2	0.8	2.4	0.1	0	1.5	0	0.2	0	0
Totals	278.7	234.9	248.8	319.0	163.3	203.9	317.9	176.6	233.8	115.4	265.4	449.7	240.2

Location	1998	1999	2000	2001	2002	2003	2004
Resurrection Bay	35.0	135.2	64.1	13.8	16.2	10.4	16.6
Aialik Bay	8.6	0.1	T	0	1.2	0	0
Nuka Bay	16.0	51.1	21.6	7.3	21.2	26.6	11.1
Port Dick	0	0	T	T	0	0	T
Halibut Cove & Lagoon	62.3	42.9	24.3	5.8	27.5	74.2	2.7
China Poot <sup>c</sup>	100.2	170.6	78.3	117.7	126.5	366.2	33.4
Tutka/Barabara	9.8	22.9	12.4	23.0	19.4	33.4	7.2
Seldovia Bay	6.0	6.3	6.4	9.0	9.5	13.8	4.9
Port Graham Bay	17.9	0.7	2.1	0	35.3	68.5	2.6
Kamishak/Douglas	0	0	T	0.5	1.4	0.8	2.1
McNeil (Mikfik)	0	7.2	0	0.3	0	0	0
Paint River	0	0	0	0	0	0	0
Chenik Lake	0	0	0	0	0	0	33.2
Bruin/Kirschner	27.5	39.8	31.6	38.9	32.5	50.4	16.4
Miscellaneous	0.7	0	T	0	0	0	T
Totals	284.0	476.8	240.9	216.3	290.7	644.3	130.1

*Source:* ADF&G fish ticket database.

*Note:* “T” denotes trace, less than 50 fish caught.

<sup>a</sup> China Poot Subdistrict, which includes China Poot, Peterson, and Neptune Bays, was part of Halibut Cove Subdistrict prior to 1988.



**Appendix A15.**—Harvest of sockeye salmon returning to China Poot and Neptune Bays in the Southern District of Lower Cook Inlet, by user group, 1979–2004.

Return Year	Sport Harvest	Personal Use Harvest	Commercial Harvest	Non-Harvested fish	Total Return
1979	650	0	<sup>a</sup>	0	650
1980	1,000	1,000	12,000	0	14,000
1981	1,500	0	10,000	0	11,500
1982	450	1,320	200	1,430	3,400
1983	480	5,910	84,020	10	90,420
1984	500	2,000	114,360	500	117,360
1985	500	3,000	61,500	920	65,920
1986	100	150	18,350	200	18,800
1987	200	2,000	21,500	0	23,700
1988	500	1,500	91,469	470	93,939
1989	1,000	7,000	79,714	0	87,714
1990	500	3,000	49,587	0	53,087
1991	1,000	4,000	117,000 <sup>b</sup>	0	122,000
1992	300	3,500	89,791 <sup>c</sup>	0	93,591
1993	400	4,000	144,677 <sup>c</sup>	0	149,077
1994	500	8,500	50,527 <sup>c</sup>	0	59,527
1995	1,000	7,000	145,392 <sup>c</sup>	450	153,842
1996	1,000	9,000	200,000 <sup>c</sup>	441	210,441
1997	650 <sup>d</sup>	4,900 <sup>e</sup>	120,900 <sup>c</sup>	1,130	127,620
1998	650 <sup>d</sup>	4,900 <sup>e</sup>	164,000 <sup>c</sup>	380	170,542
1999	650 <sup>d</sup>	4,900 <sup>e</sup>	219,300 <sup>c</sup>	522	225,983
2000	650 <sup>d</sup>	4,900 <sup>e</sup>	97,100 <sup>c</sup>	256	102,906
2001	650 <sup>d</sup>	4,900 <sup>e</sup>	126,900 <sup>c</sup>	57	132,507
2002	650 <sup>d</sup>	4,900 <sup>e</sup>	151,100 <sup>c</sup>	51	156,701
2003	650 <sup>d</sup>	4,900 <sup>e</sup>	427,327 <sup>c</sup>	121	432,998
2004	650 <sup>d</sup>	4,900 <sup>e</sup>	34,612 <sup>c</sup>	448	40,610
1984-2003 Average	603	4,450	124,512	275	129,840

*Note:* Through 1990, “Commercial Harvest” and “Total Return” includes returns only to Leisure Lake in China Poot Bay; after 1990, these figures include combined returns to both Leisure Lake in China Poot Bay and Hazel Lake in Neptune Bay.

<sup>a</sup> No data.

<sup>b</sup> Portions of the commercial sockeye harvest in China Poot, Halibut Cove, and Tutka Bay Subdistricts were attributed to the Leisure and/or Hazel Lake returns.

<sup>c</sup> The final “Sport Harvest” figures for 1997 – 2003 represent the estimated previous 10-year average.

<sup>d</sup> The final “Personal Use Harvest” figures for 1997 – 2003 represent the statewide sport fish harvest survey average for the years 1990 – 1995.

**Appendix A16.**—Commercial catch and escapement of sockeye salmon at Chenik Lake in the Kamishak Bay District of Lower Cook Inlet, 1975–2004.

Return Year	Commercial Harvest	Escapement <sup>a</sup>	Total Return
1975	b	100	100
1976	b	900	900
1977	b	200	200
1978	b	100	100
1979	b	c	c
1980	b	3,500	3,500
1981	b	2,500	2,500
1982	b	8,000	8,000
1983	2,800	11,000	13,800
1984	16,500	13,000	29,500
1985	10,500	3,500	14,000
1986	111,000	7,000	118,000
1987	102,000	10,000	112,000
1988	164,200	9,000	173,200
1989	38,905	12,000	50,905
1990	70,347	17,000	87,347
1991	60,397	10,189	70,586
1992	13,793	9,269	23,062
1993	24,567	4,000	28,567
1994	0 <sup>d</sup>	808	808
1995	0 <sup>d</sup>	1,086	1,086
1996	0 <sup>d</sup>	2,990	2,990
1997	0 <sup>d</sup>	2,338	2,338
1998	0 <sup>d</sup>	1,880	1,880
1999	0 <sup>d</sup>	2,850	2,850
2000	0 <sup>d</sup>	4,800	4,800
2001	0 <sup>d</sup>	250	250
2002	0 <sup>d</sup>	4,650	4,650
2003	0 <sup>e</sup>	13,825	13,825
2004	33,177	17,000	50,177
Avg. Since 1985	31,444	6,722	38,166

<sup>a</sup> Estimated from aerial surveys between 1975-90 and 1998-present, weir counts between 1991-97.

<sup>b</sup> Closed to fishing.

<sup>c</sup> No data.

<sup>d</sup> Due to low returns, the Chenik Subdistrict was kept closed to fishing for the entire season.

<sup>e</sup> Due to the previous decade of low returns to Chenik Lake, the Chenik Subdistrict was kept closed to all fishing to protect fish for escapement.

**Appendix A17.**—Commercial coho salmon catch in numbers of fish by district, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Southern</b>	<b>Outer</b>	<b>Kamishak</b>	<b>Eastern</b>	<b>Total</b>
1984	3,193	41	13,027	536	16,797
1985	4,258	3,210	2,024	835	10,327
1986	3,095	5,052	9,935	770	18,852
1987	2,163	2,481	8,079	1,631	14,354
1988	2,987	2	4,471	486	7,946
1989	6,667	72	4	5,346	12,089
1990	1,552	74	26	7,645	9,297
1991	9,415	12	2,337	7,283	19,047
1992	1,277	1	1,488	3,136	5,902
1993	4,431	119	3	8,924	13,477
1994	1,373	993	1,897	10,410	14,673
1995	5,161	1,272	6,084	5,192	17,709
1996	9,543	96	1	3,932	13,572
1997	5,597	63	0	5,344	11,004
1998	2,243	45	0	14,365	16,653
1999	2,757	1,482	0	3,794	8,033
2000	768	20	7	7,408	8,203
2001	2,706	5	9	3,947	6,667
2002	3,769	74	54	4,432	8,329
2003	5,408	4	4	5,886	11,302
2004	1,441 <sup>a</sup>	13	5,367	5,615	12,436
20-Year Avg.	3,918	756	2,473	5,065	12,212
1984-93 Avg.	3,904	1,106	4,139	3,659	12,809
1994-2003 Avg.	3,933	405	806	6,471	11,615
2004 % of Total	11.59%	0.10%	43.16%	45.15%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A18.**—Commercial pink salmon catch in numbers of fish by district, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Southern</b>	<b>Outer</b>	<b>Kamishak</b>	<b>Eastern</b>	<b>Total</b>
1984	336,595	89,085	138,145	136,797	700,622
1985	518,889	618,222	194	92,403	1,229,708
1986	542,521	401,755	423,774	40,243	1,408,293
1987	90,522	23,890	72,684	14,333	201,429
1988	852,382	6,094	61,080	1,740	921,296
1989	987,488	52,677	256,669	92	1,296,926
1990	178,087	191,320	2,448	11,815	383,670
1991	253,962	359,664	47,833	167,250	828,709
1992	417,021	146	2,594	60,007	479,768
1993	692,794	159,159	4,205	10,616	866,774
1994	1,589,709	13,200	33	44,987	1,647,929
1995	2,475,312	192,098	169,054	12,000	2,848,464
1996	444,236	7,199	36	35	451,506
1997	2,685,764	128,373	293	1	2,814,431
1998	1,315,042	102,172	1,776	38,829	1,457,819
1999	1,105,267	32,484	807	1,930	1,140,488
2000	1,070,065	306,555	6,214	4,473	1,387,307
2001	542,975	48,559	1,397	0	592,931
2002	953,960	569,955	446,146	0	1,970,061
2003	563,043	281,663	12,005	0	856,711
2004	2,461,959 <sup>b</sup>	42,636	12,969	0	2,517,564
20-Year Avg.	880,782	179,214	82,369	31,878	1,174,242
1984-93 Avg.	487,026	190,201	100,963	53,530	831,720
1994-2003 Avg.	1,274,537	168,226	63,776	10,226	1,516,765
2004 % of Total	97.79%	1.69%	0.52%	0.00%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A19.**—Commercial pink salmon catch in thousands of fish by subdistrict during odd-numbered years, Lower Cook Inlet, 1959–2003.

Location	1959	1961	1963	1965	1967	1969	1971	1973	1975	1977
Humpy Creek	13.2	34.5	20.6	6.7	6.9	0.6	0	37.3	242.1	26.4
Halibut Cove & Lagoon		33.4	36.9	7.1	33.4	0	11.4	7.2	97.2	16.3
Tutka/Barabara	14.4	106.8	37.7	44.6	31.6	32.9	3.9	20.0	89.2	21.9
Seldovia Bay	4.9	15.1	1.6	19.2	11.7	28.8	27.4	19.4	429.6	47.6
Port Graham Bay	5.3	1.0	2.7	12.4	5.1	2.0	1.0	13.9	18.3	44.8
Dogfish Bay	1.6	0	0	0.1	2.3	0	10.4	0.3	0	5.0
Port Chatham	1.2	0	0.8	0	0	0	26.3	20.6	16.0	1.4
Windy Bay	3.1	2.2	0	5.4	0	0	57.3	68.5	18.1	173.2
Rocky Bay	2.3	0	1.4	0.1	0	0	0.1	0.2	0	11.6
Port Dick Bay	28.2	92.9	19.0	15.3	259.9	51.5	94.6	96.6	90.3	881.7
Nuka Island	33.3	2.0	0.3	0	0.1	0	25.0	5.2	31.4	40.6
E. Nuka Bay							94.6	T	0	8.7
Resurrection Bay	8.4	0	0	0	1.2	0	0	0	0	0
Bruin Bay	0	0	12.3	0.9	2.1	0	11.7	0	0	6.2
Rocky/Ursus Coves	3.7	2.7	44.2	0	13.0	52.8	16.4	7.9	0	0
Iniskin/Cottonwood Bays	1.5	3.3	21.8	0	0.1	26.0	0	4.7	0	0.1
Miscellaneous	3.6	9.5	4.3	3.8	8.1	7.8	12.8	5.6	31.1	8.4
Total	124.7	303.4	203.6	115.6	375.5	202.4	392.9	307.4	1,063.3	1,293.9

Location	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997
Humpy Creek	277.0	239.9	8.1	5.6	0	91.4	0	0.2	13.7	0
Halibut Cove & Lagoon	27.1	11.1	18.8	5.9	30.5	254.4	91.1	100.2	1.9	2.6
China Poot <sup>a</sup>						8.5	135.7	50.6	12.9	14.5
Tutka/Barabara	416.8	1,026.6	616.0	491.2	56.5	632.1	117.6	539.4	2,428.5	2,511.2
Seldovia Bay	140.8	126.4	43.3	3.8	1.2	1.1	0.3	2.4	8.2	12.3
Port Graham Bay	124.7	45.9	4.1	12.5	2.3	0	0	0	10.2	145.1
Dogfish Bay	7.4	22.9	0.2	0	0	0	0	0	0	0
Port Chatham	174.4	47.6	3.3	7.0	0	9.7	7.5	14.7	17.6	0
Windy Bay	552.7	82.9	0	4.8	0	0	49.1	43.4	111.2	93.2
Rocky Bay	122.2	16.5	1.3	0	0	0	0	0	27.5	0
Port Dick Bay	964.8	1,140.9	140.0	455.6	3.0	0	289.7	26.6	0	0.6
Nuka Island	87.2	244.9	30.2	9.6	0	0	10.6	51.9	6.0	33.3
E. Nuka Bay	0.9	121.0	18.1	141.2	20.9	43.0	T	13.8	21.4	1.3
Resurrection Bay	0	32.6	27.1	74.6	11.8	0	0	0.7	0	0
Bruin Bay	40.3	51.9	0.3	0	1.2	202.8	45.1	0.1	104.8	0.3
Rocky/Ursus Coves	14.4	14.1	0	0	69.4	53.8	0	0	58.0	0
Iniskin/Cottonwood Bays	0.2	0	0.3	0	0.2	0	0	0	0	0
Miscellaneous	40.0	54.0	16.5	17.9	4.4	0.1	82.0	22.8	26.6	0
Total	2,990.9	3,279.2	927.6	1,229.7	201.4	1,296.9	828.7	866.8	2,848.5	2,814.4

- continued -

**Appendix A19.**—Page 2 of 2.

LOCATION	1999	2001	2003
Humpy Creek	0	0	0
Halibut Cove & Lagoon	3.4	0.2	6.5
China Poot <sup>a</sup>	19.6	4.8	41.3
Tutka/Barabara	1,080.8	533.1	511.8
Seldovia Bay	1.5	4.9	2.7
Port Graham Bay	0	0	0.7
Dogfish Bay	0	0	0
Port Chatham	0	0	0
Windy Bay	0	9.4	119.8
Rocky Bay	0	0	0
Port Dick Bay	0	16.7	137.4
Nuka Island	0	0	0
E. Nuka Bay	32.5	22.4	24.5
Resurrection Bay	0	0	0
Bruin Bay	0.8	0	12.0
Rocky/Ursus Coves	0	0.1	0
Iniskin/Cottonwood Bays	0	0	0
Miscellaneous	1.9	1.3	0
Total	1,140.5	592.9	856.7

*Source:* ADF&G fish ticket database.

*Note:* “T” denotes trace, less than 50 fish harvested

<sup>a</sup> China Poot Subdistrict, which includes China Poot, Neptune, and Peterson Bays, was part of Halibut Cove Subdistrict prior to 1988.

**Appendix A20.**—Commercial pink salmon catch in thousands of fish by subdistrict during even-numbered years, Lower Cook Inlet, 1960–2004.

Location	1960	1962	1964	1966	1968	1970	1972	1974	1976	1978
Humpy Creek	51.0	73.9	53.5	24.6	2.6	85.2	1.7	33.3	3.3	16.3
Halibut Cove & Lagoon	20.7	35.5	28.9	16.0	41.3	28.9	0.4	2.2	69.8	27.8
Tutka/Barabara	87.6	279.5	100.9	53.5	26.9	43.9	5.2	5.5	18.0	167.9
Seldovia Bay	42.6	142.8	37.4	44.1	23.6	29.0	0.2	3.5	3.0	35.8
Port Graham Bay	7.1	18.1	38.4	5.1	23.0	19.6	1.1	4.5	3.9	4.0
Dogfish Bay	1.8	1.4	0.1	7.1	0	9.8	0.3	0	0	0.3
Port Chatham	15.7	102.2	67.1	6.7	10.0	1.9	0	0	0	0
Windy Bay	29.2	85.5	68.6	20.1	3.4	0.8	0	0	0	0
Rocky Bay	17.0	225.9	53.2	0	10.8	36.8	0	0	0	0
Port Dick Bay	257.4	1,118.3	526.3	296.8	55.0	336.5	0	0.6	0	63.6
Nuka Island	26.6	129.8	23.8	0	90.2	48.4	0	0	0	0
E. Nuka Bay							0.3	T	0.1	3.3
Resurrection Bay	5.8	0.1	0.3	0	37.4	40.2	18.2	0	35.4	29.7
Bruin Bay	2.6	0	0	0	126.2	10.2	0	0	0	0
Rocky/Ursus Coves	6.6	3.2	13.5	2.9	18.0	7.5	0	0	0	0.1
Iniskin/Cottonwood Bays	2.1	3.2	4.3	0	9.9	3.5	0	0	0.1	0.1
Miscellaneous	37.8	28.9	39.1	102.3	107.1	14.0	1.3	1.0	2.8	3.4
Total	611.6	2,248.3	1,055.4	579.2	585.4	716.2	28.7	50.6	136.4	352.6

Location	1980	1982	1984	1986	1988	1990	1992	1994	1996	1998
Humpy Creek	48.6	4.9	53.5	116.7	0	0	0	0	0	0
Halibut Cove & Lagoon	4.7	1.0	10.9	14.0	106.8	91.0	58.4	105.6	2.3	2.4
China Poot <sup>a</sup>					5.4	46.1	35.7	24.2	8.2	3.3
Tutka/Barabara	312.5	184.9	262.0	400.2	723.9	37.4	320.9	1,454.5	428.2	1,300.6
Seldovia Bay	81.7	70.3	2.2	2.8	5.5	3.6	1.9	5.4	4.1	7.4
Port Graham Bay	30.5	35.4	8.0	8.8	10.7	0	0	0	1.5	0.6
Dogfish Bay	4.7	1.7	0.1	0	0	0	0	0	0	0
Port Chatham	1.8	12.6	0	0	0	22.1	0	0	0	9.4
Windy Bay	0	0	0	0	0	0	0	0	0	0
Rocky Bay	1.4	0	0	0	0	0	0	0	0	35.0
Port Dick Bay	133.3	44.0	84.6	304.0	5.9	169.1	0.1	1.6	0	2.4
Nuka Island	0	0	0	0	0	0	0	0	0	41.1
E. Nuka Bay	12.4	8.7	4.4	97.8	0.1	0.2	0	11.6	7.2	14.2
Resurrection Bay	155.8	137.4	122.3	36.5	0.5	0	0	T	T	0
Bruin Bay	100.6	13.3	125.2	349.7	5.0	0.4	1.9	T	T	1.8
Rocky/Ursus Coves	0	20.2	8.5	71.1	49.9	0	0.3	0	0	0
Iniskin/Cottonwood Bays	0.1	0.4	0.4	0.2	1.3	0	T	0	0	0
Miscellaneous	1.6	16.8	18.5	6.5	6.3	13.8	60.6	45.0	0	39.6
Total	889.7	551.6	700.6	1,408.3	921.3	383.7	479.8	1,647.9	451.5	1,457.8

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**Appendix A20.**—Page 2 of 2.

Location	2000	2002	2004
Humpy Creek	0	0	0
Halibut Cove & Lagoon	0.5	0.3	T
China Poot <sup>a</sup>	4.0	4.7	1.5
Tutka/Barabara	1,055.4	709.0	1,176.9
Seldovia Bay	10.2	1.3	0.1
Port Graham Bay	0	238.7	1,283.5
Dogfish Bay	0	0	0
Port Chatham	0	0	0
Windy Bay	0	0	0
Rocky Bay	0	0	0
Port Dick Bay	306.6	454.1	41.6
Nuka Island	0	0.0	0
E. Nuka Bay	0.3	115.9	1.1
Resurrection Bay	0.4	0	0
Bruin Bay	5.5	333.7	1.5
Rocky/Ursus Coves	0	110.1	4.5
Iniskin/Cottonwood Bays	0	0.1	6.4
Miscellaneous	4.4	2.2	0.6
Total	1,387.3	1,970.1	2,517.6

*Source:* ADF&G fish ticket database.

*Note:* “T” denotes trace, less than 50 fish harvested

<sup>a</sup> China Poot Subdistrict, which includes China Poot, Neptune, and Peterson Bays, was part of Halibut Cove Subdistrict prior to 1988.



**Appendix A21.**—Commercial chum salmon catch in numbers of fish by district, Lower Cook Inlet, 1984–2004.

<b>Year</b>	<b>Southern</b>	<b>Outer</b>	<b>Kamishak</b>	<b>Eastern</b>	<b>Total</b>
1984	8,065	3,204	70,736	10,535	92,540
1985	5,513	11,844	8,139	5,144	30,640
1986	5,560	11,701	61,670	3,757	82,688
1987	5,030	28,663	108,412	14,913	157,018
1988	7,742	71,202	218,299	24,668	321,911
1989	3,141	43	7,809	312	11,305
1990	2,433	614	3,597	307	6,951
1991	1,962	14,337	7,853	80	24,232
1992	1,885	181	20,051	86	22,203
1993	2,788	970	600	9	4,367
1994	2,631	32	14	2,792	5,469
1995	4,530	474	10,302	330	15,636
1996	3,511	3	27	223	3,764
1997	4,260	1,575	7	66	5,908
1998	3,956	611	29	51	4,647
1999	4,624	2,062	23	1,232	7,941
2000	5,340	302	66,072	1,540	73,254
2001	3,789	408	84,766	6	88,969
2002	4,803	3,810	34,641	5	43,259
2003	5,730	137	29,800	19	35,686
2004	1,376 <sup>a</sup>	27,911	177,395	1	206,683
20-Year Avg.	4,365	7,609	36,642	3,304	51,919
1984-93 Avg.	4,412	14,276	50,717	5,981	75,386
1994-2003 Avg.	4,317	941	22,568	626	28,453
2004 % of Total	0.67%	13.50%	85.83%	0.00%	100.00%

Source: ADF&G fish ticket database.

<sup>a</sup> 2004 totals include a very small number of fish retained for personal use.

**Appendix A22.**—Commercial chum salmon catch in thousands of fish by subdistrict, Lower Cook Inlet, 1959–2004.

Location	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Tutka Bay	0.1	2.4	1.8	2.9	2.4	5.6	1.1	3.9	4.0	1.3	0.7	1.6	0.5
Port Graham	2.3	1.8	0.5	4.0	3.8	2.1	0.9	5.3	3.0	2.3	1.3	4.8	2.0
Dogfish Bay	4.9	0.4	0.1	0	0.2	0	0	7.0	15.3	0.1	0	50.9	114.5
Port Chatham	1.0	2.5	0	2.8	4.3	5.2	0	17.8	0	1.0	0	0.1	2.4
Rocky/Windy Bays	14.9	6.4	2.2	8.5	0.3	33.8	8.1	1.7	0	0.5	0	39.4	1.4
Port Dick	42.4	51.0	36.8	112.0	110.8	227.4	14.2	60.9	36.0	10.9	5.4	41.2	0.7
Nuka Bay	1.7	8.4	1.7	0.5	1.5	0	0	0	1.5	6.9	0	5.9	0.1
Resurrection Bay	0.1	0.5	0	0	0	0	0	0	0.1	0.7	0	0.6	0.4
Douglas River	0.2	0	0	0	0	0	0	0	0	0	0	0	0
Kamishak River	0	0	0	0	0	0	0	0	0	3.7	0.4	0	0
McNeil River	0	0.4	0	0	0	2.7	0.9	0	0.4	8.3	4.4	1.9	0
Bruin Bay	0	0.3	0.5	0	0.1	0	0.4	0	1.0	7.5	0	12.8	1.6
Ursus/Rocky Coves	8.5	8.6	1.8	1.1	2.8	1.2	0	4.0	2.9	1.0	3.6	8.9	10.3
Cottonwood/Iniskin	12.1	33.4	10.2	41.7	10.9	38.4	0	0	19.0	25.5	44.4	71.9	14.5
Miscellaneous	22.6	0	0	5.8	1.4	6.9	2.5	28.5	2.2	5.4	1.0	2.4	0.2
Totals	110.8	116.1	55.6	179.3	138.5	323.3	28.1	129.1	85.4	75.1	61.2	242.4	148.6

Location	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Tutka Bay	1.3	0.8	1.4	2.0	0.9	0.8	2.6	2.7	1.8	7.9	8.3	9.9	3.4
Port Graham	3.2	2.6	1.0	2.2	0.5	5.0	2.4	4.3	2.5	11.2	7.4	1.7	3.6
Dogfish Bay	41.1	0.4	0	0	0	9.4	0	8.5	2.1	71.8	15.6	2.8	1.1
Port Chatham	0	0.4	0	0.6	0	0.1	0	1.7	1.3	59.5	14.1	2.1	0
Rocky/Windy Bays	0	0.9	0	0.3	0	17.7	0	76.7	2.1	7.4	0	3.2	0
Port Dick	0	33.4	8.1	6.8	0	25.6	10.3	79.0	19.0	95.8	32.5	18.0	1.9
Nuka Bay	2.3	40.8	3.9	3.6	0.4	17.4	0.4	14.7	7.8	3.8	0.9	0.8	0.2
Resurrection Bay	0.7	0	0	0	0	0	0.1	0	0.7	2.4	7.7	6.9	3.0
Douglas River	0	0	0	0.1	7.1	4.0	2.9	0.7	10.0	46.7	37.1	27.2	9.2
Kamishak River	2.4	0	1.8	0	10.5	0	23.9	17.8	2.8	8.6	9.2	23.9	16.2
McNeil River	2.3	0	2.0	0	16.9	38.5	4.9	6.5	6.3	11.6	32.6	67.9	12.0
Bruin Bay	1.8	0	0.7	0	0	0	0	4.0	11.0	1.7	1.3	2.6	5.9
Ursus/Rocky Coves	0.2	5.7	0	2.0	2.8	7.8	1.9	0.5	0.3	1.5	7.2	0	3.7
Cottonwood/Iniskin	19.7	29.9	0	2.8	11.5	15.3	14.9	0.2	5.4	3.5	21.6	21.4	23.0
Miscellaneous	0.5	0.6	0.3	1.2	0.2	4.2	9.2	1.2	0.4	2.7	2.5	3.9	9.3
Totals	75.5	115.5	19.2	21.6	50.8	145.8	73.5	218.5	73.5	336.1	198.0	192.3	92.5

Location	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Tutka Bay	3.2	3.9	3.9	4.7	2.5	1.5	0.8	0.6	0.9	0.8	1.6	1.0	1.1
Port Graham	1.3	0.8	0.4	1.2	0	0	0	0	0	0	0.7	0.7	2.0
Dogfish Bay	0	0	0	0	0	0	0	0	0	0	0	0	0
Port Chatham	1.3	0	0	0	0	0.1	0.1	0	0.1	0	T	0	0
Rocky/Windy Bays	0	0	0	0	0	0	0.5	0	0.1	0	0.4	0	1.6
Port Dick	9.6	10.4	27.1	64.4	0	0.5	13.7	0.2	0.7	T	0	0	0
Nuka Bay	0.8	1.3	1.6	6.8	0	T	T	0	T	T	0.1	T	T
Resurrection Bay	3.0	3.5	13.9	23.9	0	0	0	0	0	2.5	0.3	0.2	0
Douglas River	8.0	11.6	23.7	24.8	0	0.1	3.0	12.5	T	T	0.7	0	0
Kamishak River	0.1	0.1	24.6	26.7	0	T	0.7	1.5	0	0	0.1	0	0
McNeil River	0	13.7	32.9	104.0	0.1	0.1	0.1	2.0	0.4	0	0	0	T
Bruin Bay	0	5.4	0.1	2.8	4.4	1.6	2.6	0.8	T	0	4.9	T	T
Ursus/Rocky Coves	0	22.1	17.2	20.7	3.4	0	0	2.7	0	0	2.2	0	0
Cottonwood/Iniskin	0	8.8	9.7	39.2	0	0	1.0	0.2	0	0	2.3	0	0
Miscellaneous	3.3	1.1	1.9	2.7	0.9	3.0	1.7	1.6	2.1	2.1	2.3	1.9	1.2
Totals	30.6	82.7	157.0	321.9	11.3	7.0	24.2	22.2	4.4	5.5	15.6	3.8	5.9

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**Appendix A22.**—Page 2 of 2.

Location	1998	1999	2000	2001	2002	2003	2004
Tutka Bay	0.9	1.5	1.8	1.4	2.7	2.6	0.7
Port Graham	0.8	0	T	0	0.4	0.1	0.2
Dogfish Bay	0	0	0	0	0	0	0
Port Chatham	0.1	0	0	0	0	0	0
Rocky/Windy Bays	0.3	0	0	0.3	0	0.1	0
Port Dick	0.1	0	0.1	0.1	3.8	T	27.8
Nuka Bay	T	2.1	0.2	T	0.1	T	0.1
Resurrection Bay	0	0	1.5	T	T	T	T
Douglas River	0	0	19.9	10.3	7.0	T	6.7
Kamishak River	0	0	43.7	73.0	5.1	0	0
McNeil River	0	0	0	T	0	0	0
Bruin Bay	T	T	2.4	0	2.0	0.1	7.0
Ursus/Rocky Coves	0	0	0	1.5	3.4	0	1.8
Cottonwood/Iniskin	0	0	0	0	17.0	29.7	161.9
Miscellaneous	2.3	4.4	3.6	2.4	1.8	3.1	0.5
Totals	4.6	7.9	73.3	89.0	43.3	35.7	206.7

*Source:* ADF&G fish ticket database.

*Note:* “T” denotes trace, less than 50 fish harvested.

**Appendix A 23.**—Estimated sockeye salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1984 – 2004.

Year	English Bay	Delight Lake	Desire Lake	Bear Lake <sup>a,b</sup>	Aialik Lake	Mikfik Lake	Chenik Lake	Amakdedori Creek	Kamishak Rivers	Douglas River	Total
1984	11.1	10.5	15.0	0.5	22.0	6.0	13.0	1.4	0.1	0.0	79.6
1985	5.0	26.0	18.0	1.1	8.0	20.0	3.5	0.9	0.8	0.0	83.3
1986	2.8	13.0	10.0	0.8	7.6	7.8	7.0	1.9	5.0	0.2	56.1
1987	7.0	10.5	13.4	0.3	9.2	9.0	10.0	1.1	<sup>c</sup>	0.1	60.6
1988	2.5	1.2	9.0	0.1	13.0	10.1	9.0	0.4	0.5	0.0	45.8
1989	4.5	7.7	9.0	0.1	6.5	11.5	12.0 <sup>b</sup>	1.2	0.5	0.6	53.6
1990	3.3	5.2	9.5	0.1	5.7	8.8	17.0	1.8	0.2	0.6	52.2
1991	7.0	4.1	8.2	0.7	3.7	9.7	10.2 <sup>b</sup>	1.9	0.7	<sup>c</sup>	46.2
1992	6.4	5.9	11.9	1.9	2.5	7.8	9.3 <sup>b</sup>	1.9	4.9	0.2	52.7
1993	8.9	5.6	11.0	5.0	3.0	6.4	4.0 <sup>b</sup>	2.0	4.1	<sup>c</sup>	50.0
1994	13.8 <sup>b</sup>	5.6	10.5	8.6	7.3	9.5	0.8 <sup>b</sup>	0.8	<sup>c</sup>	<sup>c</sup>	56.9
1995	22.5 <sup>b</sup>	15.8	15.8	8.3	2.6	10.1	1.1 <sup>b</sup>	2.4	<sup>c</sup>	<sup>c</sup>	78.6
1996	12.4 <sup>b</sup>	7.7	9.4	8.0	3.5	10.5	3.0 <sup>b</sup>	2.9	1.8	0.6	55.8
1997	15.4 <sup>b</sup>	27.8 <sup>b</sup>	14.7 <sup>b</sup>	7.9	11.4	8.5	2.3 <sup>b</sup>	1.5	<sup>c</sup>	<sup>c</sup>	89.5
1998	15.4 <sup>b</sup>	9.2 <sup>b</sup>	7.9	8.4	4.9	12.6	1.9	4.1	<sup>c</sup>	<sup>c</sup>	63.1
1999	15.8 <sup>b</sup>	17.0 <sup>d</sup>	14.6	7.8	3.8	15.7	2.9	8.8	2.2	0.4	89.0
2000	12.6 <sup>b</sup>	12.3	4.0	11.9	4.3	10.9	4.8	3.3	1.5	0.4	66.0
2001	10.5 <sup>b</sup>	10.1	5.5	12.8	5.1	5.4	0.3	2.7	2.5	<sup>c</sup>	54.9
2002	16.9 <sup>b</sup>	19.6 <sup>b</sup>	16.0	12.5	6.1	16.7	4.7	3.2	3.3	<sup>c</sup>	99.0
2003	20.0 <sup>b</sup>	7.5 <sup>f</sup>	8.4	13.2	5.4	12.8	13.8	11.8	2.6	<sup>c</sup>	93.9
2004	16.7 <sup>b</sup>	7.3 <sup>f</sup>	10.7	11.9	10.1	14.0	17.0	7.2	0.8	<sup>c</sup>	95.7
20-year Average	10.6	11.1	11.1	5.5	6.8	10.3	6.5	2.8	2.0	0.3	67.1
1984-93 Average	5.9	9.0	11.5	1.1	8.1	9.7	9.5	1.5	1.9	0.2	58.2
1994-2003 Average	15.4	13.3	10.7	9.9	5.4	10.9	3.6	4.2	2.3	0.5	76.1
Sustainable Esc. Goal <sup>e</sup>	6.0–13.5	5.95–12.55	8.8–15.2	0.7–8.3	3.7–8.0	6.3–12.15	1.88–9.3	1.25–2.6	<sup>g</sup>	<sup>g</sup>	34.58–81.6

*Note:* Unless otherwise noted, estimated escapements are either peak aerial survey counts or adjusted aerial survey counts based on survey conditions and time of surveys.

<sup>a</sup> Escapement limited by Bear Lake Management Plan since 1971.

<sup>b</sup> Weir counts.

<sup>c</sup> Insufficient survey data to generate escapement estimate.

<sup>d</sup> Combination of weir and video counts.

<sup>e</sup> New sustainable escapement goals (SEG's) implemented for the first time beginning with the 2002 season.

<sup>f</sup> Combination of weir and aerial counts.

<sup>g</sup> No formal escapement goal established.

**Appendix A24.**—Estimated pink salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1960–2004.

Location	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Humpy Creek	10.0	22.6	56.0	34.7	18.5	28.0	30.0	25.0	24.7	5.4	55.2
China Poot Creek	9.0	2.0	26.0	---	---	---	---	2.5	6.0	0.2	1.5
Tutka Lagoon Creek	15.0	15.0	30.0	10.0	20.0	20.0	12.0	7.0	7.9	6.5	6.5
Barabara Creek	2.0	0.1	1.5	0.1	---	---	5.0	---	2.0	0.9	0.4
Seldovia River	25.0	25.0	50.0	13.0	60.0	30.0	86.0	55.0	53.2	60.0	23.0
Port Graham River	15.0	5.0	50.0	2.0	16.0	1.5	24.0	2.0	24.4	4.0	16.6
Dogfish Lagoon	2.0	---	3.0	---	---	---	---	---	---	---	---
Port Chatham Creeks	4.0	7.0	7.0	---	---	---	10.0	---	---	---	3.0
Windy Right Creek	8.0	10.0	12.5	4.9	6.2	2.0	7.0	6.0	2.8	3.2	2.1
Windy Left Creek	8.0	5.0	12.5	4.5	7.7	10.0	7.0	6.0	6.9	23.0	13.0
Rocky River	130.0	2.0	200.0	12.0	80.0	0.3	44.0	1.0	43.1	1.0	32.0
Port Dick Creek <sup>a</sup>	35.0	14.0	40.0	16.0	31.5	50.0	35.0	20.0	29.0	12.0	34.5
Island Creek	23.2	2.0	15.0	3.6	30.0	0.5	7.0	0.5	4.3	0.1	5.5
South Nuka Island Creek	20.0	2.0	22.0	0.1	10.0	---	10.0	---	10.0	3.0	11.0
Desire Lake Creek	---	---	18.0	---	1.3	---	---	---	---	---	---
James Lagoon	---	---	---	---	---	---	---	---	---	---	---
Aialik Lagoon	---	---	25.0	0.3	---	---	2.0	---	---	---	---
Bear Creek	1.4	---	3.1	---	6.4	---	---	---	3.1	---	---
Salmon Creek	---	---	---	---	---	---	---	---	---	---	---
Thumb Cove	---	---	---	---	---	---	---	---	---	---	---
Humpy Cove	---	---	---	---	---	---	---	---	---	---	---
Tonsina Creek	---	---	---	---	---	---	---	---	2.9	0.1	---
Big Kamishak River	---	---	100.0	75.0	75.0	---	13.0	---	---	---	---
Little Kamishak River	---	---	100.0	24.0	---	---	28.0	3.5	---	0.5	2.0
Amakdedori Creek	60.0	---	80.0	---	10.0	---	8.0	---	---	1.0	13.0
Bruin Bay River	18.0	---	300.0	25.0	---	---	20.0	0.5	---	5.0	40.0
Sunday Creek	1.5	---	5.0	2.0	---	---	20.0	---	---	1.0	2.0
Brown's Peak Creak	---	---	25.0	10.0	20.0	10.0	11.0	---	---	2.0	---
Totals	387.1	111.7	1,181.6	237.2	392.6	152.3	379.0	129.0	220.3	128.9	261.3

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**Appendix A24.**—Page 2 of 5.

Location	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Humpy Creek	45.0	13.8	36.9	17.4	64.0	27.2	86.0	46.1	200.0	64.4	115.0
China Poot Creek	2.1	1.0	6.0	5.2	21.6	2.0	3.9	11.2	20.6	12.3	5.0
Tutka Lagoon Creek	16.7	1.5	6.5	2.6	17.6	11.5	14.0	15.0	10.6	17.3	21.1
Barabara Creek	4.0	0.6	---	0.2	22.7	0.2	5.7	1.4	10.0	5.8	16.8
Seldovia River	31.1	5.8	14.5	13.7	36.2	25.6	35.7	24.6	43.7	65.5	62.7
Port Graham River	13.2	2.4	7.0	2.8	27.3	6.5	20.6	6.7	32.7	40.2	18.4
Dogfish Lagoon	0.3	---	1.0	---	2.3	---	8.1	0.6	7.3	0.3	2.6
Port Chatham Creeks	15.5	1.0	5.0	0.2	7.7	---	14.2	0.3	20.8	7.7	11.2
Windy Right Creek	13.0	0.1	4.6	0.1	18.7	0.2	11.1	0.3	10.4	3.3	4.7
Windy Left Creek	35.4	0.4	12.9	0.1	9.7	0.2	47.3	1.1	74.8	10.9	31.3
Rocky River	1.6	8.2	2.0	1.5	4.4	2.7	36.7	8.2	85.0	6.4	25.0
Port Dick Creek <sup>a</sup>	97.8	10.0	26.4	1.5	62.8	12.7	109.3	44.9	116.0	56.1	106.0
Island Creek	0.1	1.7	0.5	0.5	0.1	---	0.6	0.4	0.6	2.2	25.0
South Nuka Island Creek	14.0	0.3	16.0	---	28.0	---	12.0	---	15.0	0.3	16.0
Desire Lake Creek	30.0	0.3	3.0	---	0.4	0.6	0.8	1.0	3.0	16.0	5.0
James Lagoon	---	---	---	---	---	---	---	---	---	4.6	14.0
Aialik Lagoon	---	---	---	0.1	---	0.4	---	---	---	---	---
Bear Creek	---	0.5	---	4.9	---	10.0	---	7.8	---	13.3	0.4
Salmon Creek	---	---	---	---	---	16.9	---	11.0	---	15.5	0.1
Thumb Cove	---	---	---	1.1	---	2.0	---	2.0	---	1.2	1.0
Humpy Cove	---	---	---	0.6	---	1.4	---	0.9	---	5.7	0.4
Tonsina Creek	---	---	---	1.4	---	5.7	---	1.5	---	0.7	0.2
Big Kamishak River	---	---	15.0	1.0	---	8.0	---	12.0	10.0	2.0	---
Little Kamishak River	---	---	13.0	---	---	6.0	---	0.4	3.5	0.6	---
Amakdedori Creek	---	0.2	3.0	1.0	5.0	---	---	0.9	6.0	3.8	1.5
Bruin Bay River	22.0	2.5	2.0	0.6	20.0	13.5	60.0	33.0	200.0	400.0	95.0
Sunday Creek	43.0	2.0	5.0	0.1	20.0	0.3	9.0	0.2	12.0	5.2	14.2
Brown's Peak Creak	8.0	1.2	3.2	0.1	10.0	1.2	13.0	0.9	15.0	2.3	17.7
Totals	392.8	53.5	183.5	56.7	378.5	154.8	488.0	232.4	897.0	763.6	610.3

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**Appendix A24.**—Page 3 of 5.

Location	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Humpy Creek	31.9	104.0	84.2	117.0	49.7	26.6	21.4	93.0	27.0	17.4	14.9
China Poot Creek	3.1	14.1	8.4	1.9	11.5	3.1	3.9	8.5	4.2	2.6	4.1
Tutka Lagoon Creek	18.5	12.9	10.5	14.0	13.4	4.8	11.2	11.9	38.5	16.8	26.7
Barabara Creek	2.1	14.8	1.0	1.6	1.8	0.3	0.7	4.5	3.9	10.9	2.2
Seldovia River	38.4	27.9	14.2	22.8	28.2	7.6	16.9	26.2	27.8	30.0	14.7
Port Graham River	28.9	4.6	10.9	26.3	17.5	3.8	7.9	19.1	20.1	29.0	5.4
Dogfish Lagoon	2.6	1.0	0.6	0.2	0.4	1.2	0.3	0.2	7.1	9.3	<sup>c</sup>
Port Chatham Creeks	2.0	3.5	7.8	8.9	11.5	10.2	21.0	31.7	27.8	23.8	4.3
Windy Right Creek	4.7	4.3	3.4	5.4	2.5	2.0	1.3	6.6	7.1	20.7	3.9
Windy Left Creek	4.4	11.9	2.5	8.9	2.2	5.6	3.4	25.2	7.5	34.5	8.2
Rocky River	6.6	16.6	9.0	12.1	12.0	4.5	5.4	10.3	18.0	26.1	25.4
Port Dick Creek <sup>a</sup>	19.9	64.1	44.6	65.3	41.6	4.5	12.0	55.4	41.7	54.2	6.9
Island Creek	15.0	15.3	35.0	27.9	16.6	0.1	7.2	6.7	25.0	24.4	12.5
South Nuka Island Creek	0.4	22.2	0.6	3.6	7.0	2.8	1.2	7.3	13.3	16.4	6.1
Desire Lake Creek	12.0	8.5	23.0	62.5	32.0	11.0	2.5	47.0	1.0	1.3	0.4
James Lagoon	6.0	5.1	4.0	9.0	6.6	1.1	1.7	4.9	3.8	4.4	0.4
Aialik Lagoon	5.0	3.0	4.0	9.4	6.0	1.5	0.7	0.8	---	---	<sup>d</sup>
Bear Creek	7.9	0.8	7.7	4.1	14.0	3.5	0.2	1.7	4.4	15.4 <sup>b</sup>	2.3
Salmon Creek	21.0	0.5	10.2	2.1	8.3	1.7	0.1	1.6	---	<sup>b</sup>	5.3
Thumb Cove	7.9	4.9	4.2	14.5	4.0	2.7	0.3	4.2	---	3.4	0.4
Humpy Cove	4.0	2.0	2.5	5.0	0.9	0.3	0.4	1.0	3.8	---	<sup>c</sup>
Tonsina Creek	7.5	5.4	6.0	48.2	11.2	3.4	0.1	0.5	1.2	0.3	<sup>c</sup>
Big Kamishak River	5.0	---	---	---	5.0	---	1.0	---	---	---	<sup>c</sup>
Little Kamishak River	2.2	---	0.1	1.6	2.0	---	0.5	---	---	0.9	<sup>c</sup>
Amakdedori Creek	6.3	0.2	---	1.0	6.0	0.4	1.0	2.0	0.1	0.7	3.2
Bruin Bay River	75.0	4.0	110.0	3.5	1,200.0	24.0	29.0	350.0	19.0	74.9	3.2
Sunday Creek	12.0	4.7	12.0	11.4	109.0	29.7	18.0	103.0	2.8	20.9	2.9
Brown's Peak Creak	3.5	1.7	6.8	7.0	28.0	40.2	17.0	120.0	1.0	16.7	5.0
Totals	353.8	358.0	423.2	495.2	1,648.9	196.6	186.3	943.3	306.1	455.0	158.4

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**Appendix A24.–Page 4 of 5.**

Location	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Humpy Creek	36.0	14.1	89.3	9.0	78.3	17.5	12.8	22.4	30.5	37.1	90.9
China Poot Creek	1.6	5.7	2.0	2.8	2.8	5.7	0.7	7.5	6.6	6.5	6.7
Tutka Lagoon Creek	27.4	14.5	15.9	3.5	45.0	17.5	27.9	19.0	4.5	15.9	30.9
Barabara Creek	11.9	4.5	10.8	2.4	12.5	2.8	3.9	5.6	2.3	3.2	5.1
Seldovia River	43.4	24.4	48.5	17.8	39.1	31.5	12.2	53.5	12.3	26.9	35.1
Port Graham River	12.8	7.6	10.0	7.0	12.5	12.6	9.7	15.6	10.3	58.5	14.9
Dogfish Lagoon	0.3	1.3	13.3	2.3	20.0	6.7	12.4	11.1	2.0	1.3	5.2
Port Chatham Creeks	22.2	3.3	14.0	8.6	42.7	22.2	10.7	16.7	17.9	18.1	35.0
Windy Right Creek	13.6	2.2	11.4	9.9	13.9	19.5	5.2	23.0	10.3	14.4	23.3
Windy Left Creek	25.9	3.0	31.6	2.5	64.6	12.9	24.0	20.1	61.8	28.9	82.8
Rocky River	70.0	17.1	56.3	80.1	48.1	165.0	17.2	131.6	73.0	112.5	287.4
Port Dick Creek <sup>a</sup>	37.0	18.1	6.6	23.2	36.9	59.1	8.5	124.4 <sup>d</sup>	44.7	108.0	107.7
Island Creek	12.1	28.3	10.6	40.1	71.1	83.6	8.6	70.8	81.8	44.1	118.6
South Nuka Island Creek	34.3	1.4	6.2	6.8	9.3	14.0	2.4	13.6	20.7	14.8	41.4
Desire Lake Creek	19.3	---	---	---	6.2	6.2	6.8	21.1	67.5	78.4	34.8
James Lagoon	3.3	0.8	0.6	---	---	---	---	3.9	2.3	3.1	---
Aialik Lagoon	---	---	1.1	---	---	0.4	0.9	---	---	---	---
Bear Creek	6.6 <sup>b</sup>	34.8 <sup>b</sup>	38.6 <sup>b</sup>	8.0 <sup>b</sup>	6.3 <sup>b</sup>	13.2 <sup>b</sup>	7.8 <sup>b</sup>	35.6 <sup>b</sup>	3.0 <sup>b</sup>	2.7 <sup>b</sup>	4.4 <sup>b</sup>
Salmon Creek	b	b	b	b	b	b	b	b	b	b	b
Thumb Cove	5.5	10.8	9.3	9.5	4.7	21.0	9.2	8.5	3.1	3.7	5.1
Humpy Cove	0.9	2.2	1.8	3.4	2.2	1.2	4.0	1.7	0.3	1.8	2.6
Tonsina Creek	3.2	7.0	0.5	0.4	0.4	2.3	0.5	6.6	2.8	6.9	5.2
Big Kamishak River	---	---	---	16.7	---	2.0	5.7	14.9	---	---	---
Little Kamishak River	---	---	---	---	---	---	4.2	13.0	---	3.4	---
Amakdedori Creek	1.7	0.7	4.5	---	1.7	---	---	---	6.0	0.9	---
Bruin Bay River	86.4	5.9	307.3	27.5	162.7	134.9	2.9	176.7	18.5	1,598.5	138.7
Sunday Creek	57.8	3.1	95.9	2.8	52.5	24.0	5.3	39.8	26.2	81.9	346.7
Brown's Peak Creak	41.6	1.3	96.7	2.4	42.3	7.9	2.6	9.8	19.2	27.5	285.0
Totals	574.8	212.1	882.8	286.7	775.8	683.7	205.9	865.0	527.6	2,299.0	1,707.5

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**Appendix A24.–Page 5 of 5.**

LOCATION	2004	1960-2003 Average	Sustainable Escapement Goal <sup>e</sup>
Humpy Creek	28.9	46.6	21.65 – 85.55
China Poot Creek	3.3	6.3	2.9 – 8.2
Tutka Lagoon Creek	17.8	15.6	11.6 – 18.9
Barabara Creek	5.4	4.7	1.9 – 9.0
Seldovia River	56.8	32.7	19.05 – 38.95
Port Graham River	44.0	15.5	7.0 – 19.85
Dogfish Lagoon	3.2	4.1	---
Port Chatham Creeks	26.4	12.9	7.8 – 21.0
Windy Right Creek	12.0	7.7	3.35 – 10.95
Windy Left Creek	23.3	18.2	3.65 – 29.95
Rocky River	53.8	43.9	9.35 – 54.25
Port Dick Creek <sup>a</sup>	13.3	44.2	18.55 – 58.3
Island Creek	33.6	20.4	7.2 – 28.3
South Nuka Island Creek	6.4	11.2	2.7 – 14.25
Desire Lake Creek	24.3	16.8	1.9 – 20.2
James Lagoon	---	4.2	---
Aialik Lagoon	---	3.8	---
Bear Creek	1.2 <sup>b</sup>	8.6	2.95 – 8.45
Salmon Creek	---	7.3	1.9 – 13.25
Thumb Cove	4.3	5.5	2.35 – 8.85
Humpy Cove	1.0	2.0	0.9 – 3.2
Tonsina Creek	3.5	4.7	0.5 – 5.85
Big Kamishak River	---	21.3	3.5 – 11.0
Little Kamishak River	3.0	10.5	0.6 – 3.7
Amakdedori Creek	---	7.7	---
Bruin Bay River	66.5	145.2	18.65 – 155.75
Sunday Creek	31.5	30.9	4.85 – 28.85
Brown's Peak Creek	18.1	23.9	2.45 – 18.8
Totals	481.6	507.7	157.25 – 675.35

*Note:* Escapement estimates are derived from periodic ground surveys with stream life factors applied, or from periodic aerial surveys. Aerial survey estimates after 1990 incorporate stream life factors; prior to 1990, aerial estimates are peak aerial survey counts adjusted for survey conditions and time of surveys.

<sup>a</sup> Escapement figures for Port Dick Creek include escapements for High Tech and Well Flagged Creeks beginning in 1998.

<sup>b</sup> Escapement figure for Bear Creek represents the combined escapement for Bear and Salmon Creeks.

<sup>c</sup> Insufficient data for escapement estimates.

<sup>d</sup> Port Dick Creek counts derived from aerial data in 2000. Other methods also used to generate escapement estimates that season included ground surveys (91,795) and weir counts (142,450).

<sup>e</sup> New sustainable escapement goals (SEG's) implemented for the first time beginning with the 2002 season.

**Appendix A25.**—Estimated chum salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1984–2004.

Year	Port Graham	Dogfish Lagoon	Rocky River	Pt. Dick Head	Island Creek	Big Kamishak	Little Kamishak	McNeil River	BruinBay	Ursus Cove	Cotton- wood	Iniskin Bay	Total
1984	2.1	8.6	3.5	2.7	25.6	19.0	12.0	21.0	8.0	7.0	6.5	9.8	125.8
1985	0.5	4.9	2.5	1.0	9.1	6.0	4.5	9.5	2.0	3.0	3.0	5.0	51.0
1986	0.6	2.5	2.0	1.7	8.6	24.0	17.0	22.0	2.0	11.0	11.0	5.9	108.3
1987	1.5	2.0	0.2	6.1	13.2	12.0	18.0	26.0	10.0	9.9	17.0	9.1	125.0
1988	3.0	8.6	0.3	9.0	7.8	15.0	13.0	49.0	7.0	9.4	16.0	9.5	147.6
1989	1.3	1.8	1.2	3.3	4.8	30.0	12.0	34.0	8.0	6.3	8.0	5.9	116.6
1990	2.6	1.0	0.8	1.1	2.3	2.5	7.9	8.0	4.0	3.8	4.3	8.4	46.7
1991	1.1	3.1	---	7.4	17.3	8.7	8.4	10.0	6.0	1.3	7.7	8.3	79.3
1992	1.4	0.8	1.7	5.4	6.7	4.5	7.1	19.2	8.5	1.7	6.1	3.4	66.5
1993	2.5	5.4	0.1	2.5	3.6	9.1	6.3	17.4	6.0	7.7	12.0	8.0	78.8
1994	5.2	11.3	1.9	3.5	8.8	---	9.0	15.0	6.1	6.2	10.2	18.9	96.1
1995	3.8	4.2	5.1	3.3	7.7	<sup>a</sup>	<sup>b</sup>	14.4	6.6	11.1	15.4	22.7	90.9
1996	3.7	6.7	2.0	2.3	6.9	11.1	4.4	16.1	14.9	7.6	16.1	7.8	99.6
1997	4.1	12.7	1.1	1.9	5.2	---	---	27.5	8.8	6.2	5.6	15.4	88.5
1998	5.1	9.8	0.7	1.8	3.4	7.1	9.7	23.5	9.4	4.6	2.3	18.6	96.0
1999	6.6	18.8	5.4	2.9	16.4	11.6	8.9	13.5	10.3	21.0	12.0	23.3	150.7
2000	11.4	19.6	4.2	3.4	12.1	45.3	26.9	18.6	13.6	41.7	24.1	23.6	244.5
2001	6.0	6.1	3.0	1.8	6.3	36.3	27.2	17.0	21.8	37.7	15.9	13.8	192.9
2002	5.3	10.1	5.7	12.3	15.3	17.4	16.4	11.3	9.9	17.1	42.2	28.5	191.6
2003	2.9	13.3	5.5	5.6	16.3	16.4	22.2	23.3	13.1	30.4	72.8	18.7	240.5
2004	1.2	3.6	17.2	8.6	15.1	57.9	45.3	11.2	15.9	16.0	16.3	22.0	230.3
20-Year Avg.	3.5	7.6	2.5	4.0	9.9	16.2	12.8	19.8	8.8	12.2	15.4	13.2	125.9
1984-93 Avg.	1.7	3.9	1.4	4.0	9.9	13.1	10.6	21.6	6.2	6.1	9.2	7.3	94.9
1994-03 Avg.	5.4	11.3	3.5	3.9	9.8	20.7	15.6	18.0	11.5	18.4	21.7	19.1	158.8
Sustainable Esc. Goal <sup>b</sup>	1.45–4.8	3.35–9.15	1.2–5.4	1.9–4.45	6.4–15.6	9.35–24.0	6.55–23.8	13.75–25.75	6.0–10.25	6.05–9.85	5.75–12.0	7.85–13.7	69.6–158.75

*Note:* Escapement estimates are derived from periodic ground surveys with stream life factors applied, or from periodic aerial surveys. Aerial survey estimates after 1990 incorporate stream life factors; prior to 1990, aerial estimates are peak aerial survey counts adjusted for survey conditions and time of surveys.

<sup>a</sup> Insufficient data to generate escapement estimates.

<sup>b</sup> New sustainable escapement goals (SEG's) implemented for the first time beginning with the 2002 season.

**Appendix A26.**—Biological escapement goals (BEG's) prior to 2002 and sustainable escapement goals (SEG's) beginning in 2002 for chum salmon systems in Lower Cook Inlet, Alaska.

Chum Salmon									
System	District	Former BEG			New SEG				% Change In Midpoint
		BEG	Mid-point	Year Adopted	Low	High	Range Mid-point	n <sup>a</sup>	
Port Graham River	Southern	4,000 – 8,000	6,000	1982	1,450	- 4,800	3,125	26	-48%
Dogfish Lagoon	Outer	5,000 – 10,000	7,500	1982	3,350	- 9,150	6,250	26	-17%
Rocky River	Outer	20,000	20,000	1982	1,200	- 5,400	3,300	25	-84%
Port Dick Creek	Outer	4,000	4,000	1982	1,900	- 4,450	3,175	26	--26%
Island Creek	Outer	10,000 – 15,000	12,500	1979	6,400	- 15,600	11,000	26	-12%
Big Kamishak River	Kamishak	20,000	20,000	1982	9,350	- 24,000	16,675	22	-17%
Little Kamishak River	Kamishak	20,000	20,000	1982	6,550	- 23,800	15,175	23	-24%
McNeil River	Kamishak	20,000 – 40,000	30,000	1988	13,750	- 25,750	19,750	26	-34%
Bruin River	Kamishak	5,000 – 10,000	7,500	1988	6,000	- 10,250	8,125	26	8%
Ursus Cove	Kamishak	5,000 – 10,000	7,500	1982	6,050	- 9,850	7,950	26	6%
Cottonwood Creek	Kamishak	10,000	10,000	1982	5,750	- 12,000	8,875	26	-11%
Iniskin Bay	Kamishak	10,000	10,000	1982	7,850	- 13,750	10,775	26	8%
								Mean	-20%

<sup>a</sup> n = number of years of escapement data used in analysis.

**Appendix A27.**—Biological escapement goals (BEG's) prior to 2002 and sustainable escapement goals (SEG's) beginning in 2002 for pink salmon systems in Lower Cook Inlet, Alaska.

Pink Salmon									
System	District	Former BEG			New SEG				% Change In Midpoint
		BEG	Mid- point	Year Adopted	Low	High	Range Mid-point	n <sup>a</sup>	
Humpy Creek	Southern	25,000 – 50,000	37,500	1982	21,650	- 85,550	53,600	26	43%
China Poot Creek	Southern	5,000	5,000	1982	2,900	- 8,200	5,550	26	11%
Tutka Creek	Southern	6,000 – 10,000	8,000	1982	6,500	- 17,000	11,700	16	46%
Barabara Creek	Southern	18,000 – 24,000	21,000	1982	1,900	- 9,000	5,450	26	-74%
Seldovia Creek	Southern	25,000 – 35,000	30,000	1982	19,050	- 38,950	29,000	26	-3%
Port Graham River	Southern	20,000 – 40,000	30,000	1977	7,000	- 19,850	13,425	26	-55%
Port Chatham	Outer	10,000 – 15,000	12,500	1982	7,800	- 21,000	14,400	25	15%
Windy Creek Right	Outer	10,000	10,000	1982	3,350	- 10,950	7,150	26	-29%
Windy Creek Left	Outer	30,000 – 50,000	40,000	1982	3,650	- 29,950	16,800	26	-58%
Rocky River	Outer	50,000	50,000	1982	9,350	- 54,250	31,800	26	-36%
Port Dick Creek	Outer	20,000 – 100,000	60,000	1982	18,550	- 58,300	38,425	26	-36%
Island Creek	Outer	12,000 – 18,000	15,000	1982	7,200	- 28,300	17,750	25	18%
S. Nuka Island Creek	Outer	10,000	10,000	1982	2,700	- 14,250	8,475	24	-15%
Desire Lake	Outer	10,000 – 20,000	15,000	1986	1,900	- 20,200	11,050	23	-26%
Bear Creek	Eastern	5,000	5,000	1982	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	27	<sup>b</sup>
Salmon Creek	Eastern	10,000	10,000	1981	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	26	<sup>b</sup>
Thumb Cove	Eastern	4,000	4,000	1985	2,350	- 8,850	5,600	23	40%
Humpy Cove	Eastern	2,000	2,000	1985	900	- 3,200	2,050	22	3%
Tonsina Creek	Eastern	5,000	5,000	1982	500	- 5,850	3,175	23	-37%
Big Kamishak River	Kamishak	20,000	20,000	1982	<sup>c</sup>	<sup>c</sup>	<sup>c</sup>		<sup>c</sup>
Little Kamishak River	Kamishak	20,000	20,000	1982	<sup>c</sup>	<sup>c</sup>	<sup>c</sup>		<sup>c</sup>
Bruin River	Kamishak	25,000 – 50,000	37,500	1982	18,650	- 155,750	87,200	26	133%
Sunday Creek	Kamishak	10,000 – 20,000	15,000	1989	4,850	- 28,850	16,850	26	12%
Brown's Peak Creek	Kamishak	10,000 – 20,000	15,000	1989	2,450	- 18,800	10,625	26	-29%
Mean									-10%

<sup>a</sup> n = number of years of escapement data used in analysis

<sup>b</sup> Based on BOF actions in November 2004, the SEG's for Bear and Salmon Creeks were combined to form a new SEG range of 5,000 to 23,500 pink salmon.

<sup>c</sup> Based on BOF actions in November 2004, the pink salmon SEG's for Big and Little Kamishak Rivers were removed.

127

<sup>a</sup> n = number of years of escapement data used in analysis.

**Appendix A29.**—Personal use/subsistence set gillnet salmon catches, in numbers of fish by species, and effort, Southern District, Lower Cook Inlet, 1969–2004.

Year	Permits Issued	Permits Returned		Permits		Salmon Harvest						
		Number	%	Did Fish	Not Fished	Chinook	Sockeye	Coho	Pink	Chum	Other	Total
1969	47	44	93.6	35	9	0	9	752	38	0	17	816
1970	78	73	93.6	55	18	0	12	1,179	143	13	39	1,386
1971	112	95	84.8	53	42	2	16	1,549	44	7	20	1,638
1972	135	105	77.8	64	41	1	11	975	48	69	19	1,123
1973	143	128	89.5	82	46	0	18	1,304	84	40	9	1,455
1974	148	118	79.7	52	66	0	16	376	43	77	27	539
1975	292	276	94.5	221	55	4	47	1,960	632	61	95	2,799
1976	242	221	91.3	138	83	16	46	1,962	1,513	56	75	3,668
1977	197	179	90.9	137	42	12	46	2,216	639	119	84	3,116
1978	311	264	84.9	151	113	4	35	2,482	595	34	89	3,239
1979	437	401	91.8	238	163	6	37	2,118	2,251	41	130	4,583
1980	533	494	92.7	299	195	43	32	3,491	1,021	25	153 <sup>a</sup>	4,765
1981	384	374	97.4	274	100	25	64	4,314	732	89	100	5,324
1982	395	378	95.7	307	71	39	46	7,303	955	123	8	8,474
1983	360	328	91.1	210	118	4	21	2,525	330	40	2	2,922
1984	390	346	88.7	219	127	4	25	3,666	821	87	25	4,628
1985	316	302	95.6	205	97	5	43	3,372	166	35	3	3,624
1986	338	310	91.7	247	63	7	68	3,831	3,132	56	0	7,094
1987	361	338	93.6	249	89	5	50	3,977	279	61	0	4,372
1988	438	404	92.2	287	117	14	60	4,877	1,422	75	0	6,448
1989	466	452	97.0	332	120	41	156	7,215	882	53	49	8,396
1990	578	543	93.9	420	123	12	200	8,323	1,846	69	0	10,450
1991	472	459	97.2	295	164	8	47	4,931	366	23	0	5,375
1992	365	350	95.9	239	111	5	63	2,277	643	21	0	3,009
1993	326	317	97.2	215	102	6	44	1,992	463	18	0	2,523
1994	286	284	99.3	224	60	66	80	4,097	1,178	18	0	5,439
1995	235	232	98.7	178	54	118	108	2,916	343	7	0	3,492
1996	299	293	98.0	213	80	302	102	3,347	1,022	24	0	4,797
1997	276	264	95.7	185	79	383	191	1,814	252	12	0	2,652
1998	227	214	94.3	142	72	135	20	1,461	167	5	0	1,788
1999	146	141	96.6	111	30	276	119	1,803	168	3	0	2,369
2000	213	206	96.7	151	55	104	28	2,064	304	4	0	2,504
2001	154	148	96.1	112	34	86	27	1,579	150	16	0	1,858
2002	122	113	92.6	93	20	61	33	1,521	251	12	0	1,878
2003	104	96	92.3	72	24	17	57	1,071	170	9	0	1,324
2004	91	82	90.1	64	18	7	56	1,554	172	16	0	1,805
69-03 Avg.	284	266	93.6	186	79	52	57	2,887	658	41	24	3,719
94-03 Avg.	206	199	96.6	148	51	155	77	2,168	401	11	0	2,811

Note: Figures after 1991 include information from both returned permits and inseason oral reports.

<sup>a</sup> Steelhead trout *Onchorhynchus mykiss*.

**Appendix A30.**—Summary of personal use/subsistence salmon gillnet fishermen in the Southern District of Lower Cook Inlet (excluding the Port Graham/Nanwalek subsistence fishery and the Seldovia subsistence fishery) by area of residence, 1984–2004.

	Homer/ Fritz Cr.		Anchorage Area <sup>a</sup>		Halibut Cove		Anchor Pt./ Ninilchik		Seldovia		Pt. Graham/ Nanwalek		Kenai/ Soldotna		Other		Total Permits Issued
Year	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
1984	266	72.1	20	5.4	6	1.6	62	16.8	5	1.4	1	0.3	5	1.4	4	1.1	369
1985	251	79.4	15	4.7	6	1.9	33	10.4	6	1.9	0	0.0	2	0.6	3	0.9	316
1986	280	82.8	18	5.3	4	1.2	29	8.6	1	0.3	0	0.0	1	0.3	5	1.5	338
1987	284	78.7	25	6.9	3	0.8	37	10.2	7	1.9	0	0.0	2	0.6	3	0.8	361
1988	338	77.2	36	8.2	5	1.1	43	9.8	6	1.4	0	0.0	10	2.3	0	0.0	438
1989	348	74.7	36	7.7	5	1.1	51	10.9	8	1.7	0	0.0	6	1.3	12	2.6	466
1990	441	76.3	36	6.2	5	0.9	65	11.2	12	2.1	0	0.0	6	1.0	13	2.2	578
1991	384	81.4	27	5.7	8	1.7	41	8.7	6	1.3	0	0.0	4	0.8	2	0.4	472
1992	302	82.7	21	5.8	5	1.4	32	8.8	3	0.8	0	0.0	1	0.3	1	0.3	365
1993	242	74.2	25	7.7	5	1.5	44	13.5	3	0.9	0	0.0	5	1.5	2	0.6	326
1994	235	82.2	20	7.0	4	1.4	21	7.3	1	0.3	0	0.0	1	0.3	4	1.4	286
1995	191	81.3	15	6.4	7	3.0	20	8.5	1	0.4	0	0.0	0	0.0	1	0.4	235
1996	241	80.6	16	5.4	7	2.3	26	8.7	3	1.0	1	0.3	2	0.7	3	1.0	299
1997	232	84.1	13	4.7	3	1.1	20	7.2	4	1.4	0	0.0	1	0.4	3	1.1	276
1998	175	77.1	18	7.9	2	0.9	24	10.6	5	2.2	0	0.0	2	0.9	1	0.4	227
1999	96	65.8	18	12.3	1	0.7	23	15.8	3	2.1	0	0.0	4	2.7	1	0.7	146
2000	168	78.9	15	7.0	2	0.9	21	9.9	4	1.9	0	0.0	1	0.5	2	0.9	213
2001	109	70.8	10	6.5	3	1.9	20	13.0	5	3.2	0	0.0	4	2.6	3	1.9	154
2002	85	69.7	7	5.7	3	2.5	14	11.5	6	4.9	0	0.0	6	4.9	1	0.8	122
2003	74	71.2	9	8.7	2	1.9	11	10.6	4	3.8	0	0.0	4	3.8	0	0.0	104
2004	70	76.9	9	9.9	2	2.2	7	7.7	2	2.2	0	0.0	1	1.1	0	0.0	91
20-Year Avg.	237	77.9	20	6.6	4	1.4	32	10.5	5	1.5	0	0.0	3	1.1	3	1.1	305
1984-93 Avg.	314	77.8	26	6.4	5	1.3	44	10.8	6	1.4	0	0.0	4	1.0	5	1.1	403
1994-03 Avg.	161	77.9	14	6.8	3	1.6	20	9.7	4	1.7	0	0.0	2	1.2	2	0.9	206

<sup>a</sup> After 1989, “Anchorage Area” includes Mat-Su Valley, Eagle River, Chugiak, and/or Fort Richardson.

**Appendix A31.**—Subsistence and sport salmon catch in numbers of fish by species for the village of Port Graham, Lower Cook Inlet, 1984–2004.

Year	Salmon Harvest						Dolly Varden	Households Reporting
	Chinook	Sockeye	Coho	Pink	Chum	Total		
1984	27	2,037	125	269	6	2,464	0	23
1985	141	481	91	32	24	769	0	23
1986	123	274	179	237	13	826	12	27
1987	20	219	575	230	70	1,114	20	33
1988	96	411	459	542	75	1,583	18	27
1989	51	94	460	640	58	1,303	159	20
1990	211	524	803	1,013	102	2,653	666	32
1991	155	58	541	1,494	185	2,433	257	33
1992	129	98	475	745	178	1,625	398	36
1993	253	154	346	997	135	1,885	214	31
1994	273	260	859	866	461	2,719	1,133	42
1995	486	379	369	786	376	2,396	66	49 <sup>a</sup>
1996	255	684	341	312	251	1,843	161	48
1997	202	324	203	497	152	1,378	57	25
1998	164	271	243	459	240	1,377	20	16
1999	383	360	427	150	214	1,534	64	21
2000	241	784	252	355	483	2,115		35
2001	104	176	57	20	32	389		15
2002	250	417	90	150	74	981		23
2003	321	1,991	425	266	150	3,153	87	16
2004	283	572	514	363	130	1,862		50 <sup>b</sup>
1984-2003 Average	194	501	366	503	164	1,728	196	29

Source: ADF&G, Subsistence Division, data files; gear types include set gillnet, rod/reel, and handline.

<sup>a</sup> Salmon totals and permits include 3 reports from non-residents of Port Graham Village.

<sup>b</sup> ADF&G Subsistence Division estimate.



**Appendix A32.**—Subsistence and sport salmon catch in numbers of fish by species for the village of Nanwalek (formerly English Bay), Lower Cook Inlet, 1984–2004.

Year	Salmon Harvest						Dolly Varden	Households Reporting
	Chinook	Sockeye	Coho	Pink	Chum	Total		
1984	18	1,225	385	404	0	2,032	0	1
1985	5	696	530	313	2	1,546	0	1
1986	2	373	302	825	1	1,503	144	17
1987	1	682	339	484	44	1,550	20	22
1988	8	610	385	1,214	35	2,252	70	21
1989	0	63	695	855	16	1,629	523	24
1990	54	638	614	1,947	49	3,302	2,833	28
1991	8	630	1,512	3,093	36	5,279	848	30
1992	71	437	675	676	58	1,917	1,331	35
1993	24	994	567	1666	122	3,373	577	25
1994	27	570	511	1113	43	2,264	473	28
1995	99	1,416	169	487	0	2,171	465	38
1996	55	1,060	598	437	25	2,175	221	27
1997	0	1	0	14	1	16	0	1
1998	5	18	0	0	0	23	31	3
1999	102	2,755	1,320	1,873	890	6,940	631	32
2000	18	3,880	1,579	1,251	471	7,199		32
2001	29	909	1,238	1,434	196	3,806		34
2002	96	10,203	967	1,681	414	13,441	230	56
2003	144	3,221	513	1,306	381	5,565	102	35
2004	52	2,968	842	1,277	95	5,234	291	24
1984-2003 Average	38	1,520	645	1,054	139	3,396	472	25

Source: ADF&G, Subsistence Division, data files; gear types include set gillnet, rod/reel, and handline.

**Appendix A33.**—Salmon set gillnet catch in numbers of fish by species and permit/effort information for the Seldovia area subsistence fishery, Lower Cook Inlet, 1996 – 2004.

YEAR	Number of Permits				Number of Salmon Harvested					
	Issued	Returned	Fished	Not Fished	Chinook	Sockeye	Coho	Pink	Chum	Total
<i>Early Season: April – May<sup>a</sup></i>										
1996	41	41	13	28	51	7	0	0	0	58
1997	19	16	12	4	44	19	0	0	0	63
1998	20	19	10	9	132	61	0	8	0	201
1999	16	15	12	3	150	130	0	0	38	318
2000	28	21	17	4	189	249	0	0	14	452
2001	19	17	14	3	134	124	0	0	0	258
2002	20	18	12	6	123	222	0	0	3	348
2003	19	13	10	3	67	210	0	1	54	332
2004	13	10	9	1	91	63	0	0	15	169
Average	22	19	12	7	109	121	0	1	14	244
<i>Late Season: August</i>										
1996	4	3	1	2	0	1	0	0	0	1
1997	1	1	0	1	0	0	0	0	0	0
1998	3	2	1	1	0	0	0	0	0	0
1999	0									
2000	0									
2001	0									
2002	1	1	1	0	0	9	13	31	6	59
2003	1	1	1	0	0	10	1	12	1	24
2004	1	1	1	0	0	0	4	0	0	4
Average	1	2	1	1	0	3	3	7	1	15

<sup>a</sup> Season dates in 1996 and 1997 were from April 1 – May 20; subsequent years were from April 1 – May 30.

**Appendix A34.**—ADF&G, CIAA, and/or CRRC salmon stocking projects and releases of salmon fry, fingerling, and smolt, in millions of fish, Lower Cook Inlet, 1984–2004 (currently active projects highlighted in gray).

Juvenile Sockeye Salmon														
YEAR	Leisure Lake	Hazel Lake	Chenik Lake	Paint River Upper	Lakes Lower	Elusivak	Kirschner Lake	Bruin Lake	Ursus Lake	Port Dick Lake	English Bay Lakes	Bear Lake	Grouse Lake	Total Sockeye
1984	2.110													2.100
1985	2.018													2.018
1986	2.350		0.839	0.500	0.320									4.009
1987	2.022		1.000				0.867			0.705				4.594
1988	2.100	0.783	2.600	1.100	0.552	0.521	0.521			0.222				8.399
1989	2.000	1.000	3.500	1.000	0.500	0.500	0.250			0.430		2.200		11.380
1990	1.750	1.250	3.250	1.000	0.500	0.500	0.250	0.500			0.350	2.400		11.750
1991	2.000	1.300	2.200	0.500	0.250		0.250	0.250			0.241	1.619		8.610
1992	2.000	1.000	2.750	0.500	0.250		0.250	0.250	0.250		0.290	2.370		9.910
1993	2.000	1.000	1.400	0.500	0.250		0.250	0.250	0.250		0.581	1.813		8.294
1994	0	0	0	0	0		0.300	0	0		0.800	0.170	0.570	1.327
1995	1.632	1.061	1.129	0.337	0.251		0.251	0.251	0.252		0	0.360	0.793	6.287
1996	1.490	1.030	0.951	0.500	0		0.250	0.250	0.250		0.155	0.864	0	5.657
1997	2.000	1.000	0				0.250				0.199	0.788	1.966	6.203
1998	2.005	1.302					0.250				0	0.265	1.288	5.610
1999	0.265	0.453					0.173				1.149 <sup>a</sup>	1.380	0	3.420
2000	1.708	1.248					0.248				1.006 <sup>b</sup>	1.794		6.004
2001	0.089	0					0				0	0.145		0.234
2002	2.249	1.280		0.500 <sup>c</sup>			0.302				0	2.407		6.738
2003	2.240	1.547					0.298				0.695	1.801		6.581
2004	2.002	0.351					0.251				0.050	3.009		5.663
AVG.	1.709	0.913	1.635	0.536	0.261	0.507	0.289	0.250	0.200	0.452	0.368	1.454	0.691	5.942

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Appendix A34.–Page 2 of 3.

YEAR	Juvenile Pink Salmon					Juvenile Chinook Salmon					
	Tutka Bay Hatchery	Halibut Cove Lagoon	Homer Spit	Port Graham Hatchery	Total Pinks	Seldovia Bay	Halibut Cove Lagoon	Homer Early	Spit Late	Resurrection Bay <sup>d</sup>	Total Chinook
1984	19.560				19.560			0.080		0.111	0.191
1985	23.500				23.500		0.098	0.152		0.186	0.436
1986	23.100	2.000			25.100		0.101	0.104		0.101	0.306
1987	20.500	3.000	0.295		23.795	0.084	0.094	0.104		0.096	0.378
1988	12.000	3.000	0.300		15.300	0.084	0.094	0.104		0.205	0.487
1989	30.100	6.000	0.332		36.432	0.108	0.115	0.104		0.307	0.634
1990	23.600	6.000	0.303		29.903	0.099	0.112	0.212		0.329	0.752
1991	23.600	6.000	0.303	0.255	30.158	0.091	0.092	0.191		0.466	0.840
1992	23.600	6.000	0.300	1.800	31.700	0.113	0.117	0.226	0.126	0.370	0.952
1993	43.000	6.000		0	49.000	0.107	0.100	0.212	0.100	0.290	0.809
1994	61.000			1.295	62.295	0.106	0.107	0.192	0.157	0.270	0.832
1995	63.000			0.358	63.358	0.113	0.036	0.228	0.124	0.315	0.816
1996	105.000			6.470	111.470	0.109	0.103	0.101	0.121	0.415	0.849
1997	89.000			0.910	89.910	0.092	0.078	0.216	0.105	0.321	0.812
1998	90.000			0	90.000	0.079	0.073	0.137	0.120	0.307	0.716
1999	60.132			4.617	64.749	0.074	0.079	0.163	0.059	0.174	0.549
2000	65.120			1.144	66.264	0.068	0.083	0.220		0.322	0.693
2001	99.336			27.299	126.635	0.103	0.107	0.208		0.228	0.646
2002	100.000			6.604	106.604	0.083	0.106	0.190		0.194	0.573
2003	67.967			57.158	125.125	0.108	0.107	0.206		0.220	0.641
2004	47.964			36.283	84.247	0.089	0.104	0.169		0.214	0.576
AVG.	51.956	4.750	0.306	10.300	60.719	0.095	0.095	0.168	0.114	0.259	0.642

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Appendix A34.–Page 3 of 3.

YEAR	Juvenile Coho Salmon					Total Coho
	Caribou Lake	Seldovia Lake	<u>Homer Spit</u> Early	Late	Resurrection Bay <sup>e</sup>	
1984					0.341	0.341
1985	0.139	0.083			0.407	0.629
1986	0.138	0.072			0.622	0.832
1987	0.150	0.045			0.604	0.799
1988	0.150	0.045		0.060	0.530	0.785
1989	0.182	0.080		0.143	0.339	0.744
1990	0.180	0.050		0.123	1.126	1.479
1991	0.180	0.050		0.100	0.599	0.929
1992	0.150			0.100	0.265	0.515
1993	0.150			0.116	0.844	1.110
1994	0.064			0.156	0.560	0.780
1995				0.110	0.701	0.811
1996				0.150	0.676	0.826
1997				0.120	0.808	0.928
1998				0.148	0.726	0.874
1999				0.137	1.603	1.740
2000				0.122	0.618	0.740
2001			0.125	0.100	0.431	0.656
2002			0.096	0.121	0.241	0.458
2003			0.223	0.103	0.905	1.231
2004			0.130	0.113	0.742	0.985
AVG.	0.148	0.061	0.144	0.119	0.652	0.866

<sup>a</sup> Sockeye release at English Bay consisted of 918,000 fry released in Nov. 1999 and 231,000 fry held over winter for release in spring 2000.

<sup>b</sup> Sockeye release at English Bay consisted of 906,000 fry released in summer 2000 and an estimated 100,000 fry held over winter for release in spring 2001.

<sup>c</sup> Fall fry (“pre-smolt”) release.

<sup>d</sup> Chinook releases in Resurrection Bay are a cumulative total for all locations.

<sup>e</sup> Coho releases in Resurrection Bay are a cumulative total for all locations.



## **APPENDIX B. HISTORICAL HERRING TABLES**

**Appendix B1.**—Catch of Pacific herring in short tons and effort in number of permits by district in the commercial sac roe seine fishery, Lower Cook Inlet, 1984–2004.

Year	<u>Southern</u>		<u>Kamishak</u>		<u>Eastern</u>		<u>Outer</u>		<u>Total</u>	
	Tons	Permits	Tons	Permits	Tons	Permits	Tons	Permits	Tons	Permits
1984	---	---	---	---	---	---	---	---	---	---
1985	---	---	1,132	23	204	7	12	2	1,348	29
1986	---	---	1,959	54	167	4	28	3	2,154	57
1987	---	---	6,132	63	584	4	202	9	6,918	69
1988	---	---	5,548	75	0	0	0	0	5,548	75
1989	170	6	4,801	75	0	0	0	0	4,971	75
1990	---	---	2,264	75	---	---	---	---	2,264	75
1991	---	---	1,992	58	0	0	0	0	1,992	58
1992	---	---	2,282	56	0	0	0	0	2,282	56
1993	---	---	3,570	60	---	---	---	---	3,570	60
1994	---	---	2,167	61	---	---	---	---	2,167	61
1995	---	---	3,378	60	---	---	---	---	3,378	60
1996	---	---	2,984	62	---	---	---	---	2,984	62
1997	---	---	1,746 <sup>a</sup>	45 <sup>a</sup>	---	---	---	---	1,746	45
1998	---	---	331 <sup>a</sup>	20 <sup>a</sup>	---	---	---	---	331	20
1999	---	---	100 <sup>b</sup>	1 <sup>b</sup>	---	---	---	---	100	1
2000	---	---	---	---	---	---	---	---	---	---
2001	---	---	---	---	---	---	---	---	---	---
2002	---	---	---	---	---	---	---	---	---	---
2003	---	---	---	---	---	---	---	---	---	---
2004	---	---	---	---	---	---	---	---	---	---
20-Year										
Average	170	6	2,692	56	136	2	35	2	2,784	57
1984-93										
Average	170	6	3,298	60	136	2	35	2	3,450	61
1994-2003										
Average	---	---	1,784	50	---	---	---	---	1,784	50

Source: ADF&G fish ticket database.

<sup>a</sup> Includes both commercial harvest and ADF&G test fish harvest.

<sup>b</sup> Commercial fishery closed, ADF&G test fish harvest only.



**Appendix B2.**—Preseason estimates of biomass and projected commercial sac roe seine harvests, and actual harvests, for Pacific herring *Clupea pallasii* in short tons, average roe recovery, numbers of permits making landings, and exvessel value in millions of dollars, Kamishak Bay District, Lower Cook Inlet, 1984–2004.

Year	Preseason		Actual Commercial Harvest (st) <sup>a</sup>	Average Roe %	No. of Permits w/Landings	Exvessel Value <sup>b</sup> (\$ millions)
	Forecasted Biomass (st)	Projected Harvest (st) <sup>a</sup>				
1984	<sup>c</sup>	<sup>d</sup>	- closed -	---	---	---
1985	<sup>c</sup>	<sup>d</sup>	1,132	11.3	23	1.00
1986	<sup>c</sup>	<sup>d</sup>	1,959	10.4	54	2.20
1987	<sup>c</sup>	3,833	6,132	11.3	63	8.40
1988	<sup>c</sup>	5,190	5,548	11.1	74	9.30
1989	37,785	5,000	4,801	9.5	74	3.50 <sup>e</sup>
1990	28,658	2,292	2,264	10.8	75	1.80
1991	17,256	1,554	1,992	11.3	58	1.30
1992	16,431	1,479	2,282	9.7	56	1.40
1993	28,805	2,592	3,570	10.2	60	2.20
1994	25,300	3,421	2,167	10.6	61	1.50
1995	21,998	2,970	3,378	9.8	60	4.00
1996	20,925	2,250	2,984	10.1	62	6.00 <sup>e</sup>
1997	25,300	3,420	1,746	9.3	45	0.40
1998	19,800	1,780	331	8.5	20	0.07
1999	<sup>f</sup>	---	- closed -	---	---	---
2000	6,330	---	- closed -	---	---	---
2001	11,352	---	- closed -	---	---	---
2002	9,020	---	- closed -	---	---	---
2003	4,771	---	- closed -	---	---	---
2004	3,554	---	- closed -	---	---	---
1984-2003 Average	19,552	2,982	2,878	10.3	56	3.08

<sup>a</sup> Kamishak Bay allocation only, does not include Shelikof Strait food/bait allocation.

<sup>b</sup> Exvessel values exclude any postseason retroactive adjustments (except where noted).

<sup>c</sup> Prior to 1989, preseason forecasts of biomass were not generated.

<sup>d</sup> Prior to 1987, preseason harvest projections were not generated.

<sup>e</sup> Includes retroactive adjustment.

<sup>f</sup> 1999 preseason biomass calculated as a range of 6,000 to 13,000 st.

**Appendix B3.**—Summary of herring sac roe seine fishery openings and commercial harvests in the Kamishak Bay District of Lower Cook Inlet, 1969–2004.

Year	Dates of Openings	Total Hrs. Open	Harvest (short tons)	Catch Rate (short tons/hour open)	Number of Permits w/Landings
1969-1973	No closed periods				
1974	1/1 - 5/20		2,114		26
1975	1/1 - 6/6	(Closed Iniskin Bay 5/17)	4,119		40
1976	1/1 - 5/21	(Closed Iniskin Bay 5/17; reopened Kamishak 6/2)	4,824		66
1977	1/1 - 5/31	(Closed Kamishak Dist. 5/12; reopened 5/14 - 5/17; reopened 5/29 - 5/31)	2,908		57
1978 <sup>a</sup>	4/16 - 5/31	96	402	4.2	44
1979	5/12 - 5/15	72	415	5.8	36
1980-1984	CLOSED	0	0		
1985	4/20 - 6/15	1,350 (56.2 days)	1,132	0.8	23
1986	4/20 - 6/13	1,303 (54.3 days)	1,959	1.5	54
1987	4/21 - 4/23	65	6,132	94.3	63
1988	4/22 - 4/29	42	5,548	132.1	74
1989	4/17 - 4/30	24.5	4,801	196.0	74
1990	4/22 - 4/23	8	2,264	283.0	75
1991	4/26	1	1,992	1,992.0	58
1992	4/24	0.5	2,282	4,564.0	56
1993	4/21	0.75	3,570	4,760.0	60
1994	4/25	0.5	778	1,556.0	35
	4/29	1.0	1,338	1,338.0	53
1995	4/27	0.5	1,685	3,370.0	45
	4/28	1.0	1,693	1,693.0	44
1996	4/24	0.5	2,984	5,968.0	62
1997	4/25 <sup>b</sup>	0.5	0	0	0
	4/29	1.5	1,580	1,053.3	42
	4/30	8.0	61	7.6	<sup>c</sup>
	5/1	12.0	51	4.3	4
	5/22 <sup>d</sup>	<sup>d</sup>	54	<sup>d</sup>	---
1998	4/21	0.5	160	320.0	12
	4/22	2.0	136	68.0	11
	5/14 <sup>d</sup>	<sup>d</sup>	10	<sup>d</sup>	---
	5/22 <sup>d</sup>	<sup>d</sup>	23	<sup>d</sup>	---
1999-2004	CLOSED	0	100 <sup>d</sup>		

<sup>a</sup> Management by emergency order began.

<sup>b</sup> Despite the open fishing period, the entire fleet collectively agreed not to fish due to ongoing price negotiations with processors.

<sup>c</sup> To comply with **AS 16.05.815 CONFIDENTIAL NATURE OF CERTAIN REPORTS AND RECORDS**, effort data has been masked where fewer than four vessels fished in a given area.

<sup>d</sup> ADF&G test fishing harvest in 1999.

**Appendix B4.**—Estimates of Pacific herring *Clupea pallasii* total biomass in short tons using two different methods, actual commercial sac roe seine harvest in short tons, and percent exploitation, Kamishak Bay District, Lower Cook Inlet, 1984 – 2004.

Year	Aerial Survey Total Biomass Estimate (st) <sup>a</sup>	ASA Model Total Biomass <sup>b,c</sup> Estimate (st)	Actual Commercial Harvest (st)	Estimated Exploitation <sup>b</sup> Rate (%)
1984	6,500	34,469	- closed -	---
1985	13,320	34,001	1,132	3.3
1986	26,001	30,952	1,959	6.3
1987	35,332	29,696	6,132	20.6
1988	29,548	23,549	5,548	23.6
1989	35,701	19,610	4,801	24.5
1990	19,664	15,779	2,264	14.3
1991	18,163 <sup>d</sup>	16,107	1,992	12.4
1992	24,077	14,476	2,282	15.8
1993	32,439	12,701	3,570	28.1
1994	25,344 <sup>d</sup>	10,375	2,167	20.9
1995	25,115	8,274	3,378	40.8
1996	27,640	6,086	2,984	49.0
1997	---	4,140	1,746	42.2
1998	---	3,266	331	10.1
1999	---	3,053	- closed -	---
2000	---	3,006	- closed -	---
2001	---	2,811	- closed -	---
2002	---	2,733	- closed -	---
2003	---	2,765	- closed -	---
2004	---	2,546	- closed -	---
1984-2005 Average	24,526	13,892	2,878	17.4

<sup>a</sup> Diverse methods have been used to generate historical aerial survey biomass estimates; after 1989, see LCI herring forecast report or statewide herring forecast document to determine specific method for individual year.

<sup>b</sup> Figures are based on the best available data at the time of publishing and are subject to change; therefore all figures herein supercede those previously reported.

<sup>c</sup> ASA model integrates heterogeneous data sources and simultaneously minimizes differences between observed and expected return data to forecast the following year's biomass as well as hindcast previous years' biomass.

<sup>d</sup> Due to poor aerial survey conditions, biomass was calculated from the pre-season estimate of abundance, adjusted to match observed age composition samples in the commercial catch.